



# Essays in Applied Microeconomics

## Citation

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# Essays in Applied Microeconomics

A dissertation presented by

Jisoo Hwang

to

The Department of Economics

in partial fulfillment of the requirements  
for the degree of  
Doctor of Philosophy  
in the subject of  
Economics

Harvard University  
Cambridge, Massachusetts

May 2013

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## Essays in Applied Microeconomics

### Abstract

This dissertation consists of three essays in labor economics and political economy.

Chapter 1 studies the relative decrease of college graduate women’s marriage rates in developed Asian countries—the “Gold Miss” phenomenon. Using a dynamic model, I show that this phenomenon can be explained by the interaction of rapid economic growth combined with the intergenerational transmission of gender attitudes. I test the implications of the model using three datasets: Japanese General Social Survey, American Time Use Survey, and the Census. First, in the Japanese data, I find a positive relationship between a mother’s education (and employment) and her son’s gender attitudes. Second, in the U.S., housework time of Asian women is inversely related to the female labor force participation rate in husband’s country of origin. Lastly, college graduate Korean and Japanese women in the U.S. have greater options in the marriage market.

Chapter 2 (with Johanna Mollerstrom) uses a citizen candidate model to investigate the role of gradualism and election when agents have present-biased preferences. We find that gradual reforms, despite its inefficiencies, may actually be welfare-enhancing relative to big bang, because time-inconsistent voters would otherwise delay implementing policies with front-loaded costs. In order to commit to gradualism (and avoid procrastination), sophisticated agents elect an agenda setter more patient than the median voter. The results suggest the potential virtues of gradual reforms under time-inconsistency, and shows how election may serve as a commitment device.

Chapter 3 empirically examines how the burden of the second shift—housework—is influenced by the individual’s and spouse’s cultural background. Using the American Time

Use Survey, I analyze the time spent on household chores among married men and women, by their country of origin and generation since migrating to the U.S. I find differential effects by sex and generation. First generation's housework time, particularly women's, is inversely related to the female labor force participation rates in their father's birthplace, and is also influenced by the source country and U.S. nativity of their spouses. Assimilation to U.S. gender roles occurs among the second generation such that variation in housework time decreases relative to the first generation.

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## Acknowledgments

I owe my development as a researcher to my advisors. My primary advisor, Claudia Goldin, was an inspiring mentor. Her enthusiasm and expertise drove my research forward and helped me realize the kind of research I want to pursue. Alberto Alesina introduced me to the field of political economy and instilled confidence in my research potential with his encouragements early on in my graduate years. Raj Chetty offered constructive advice on any project I brought up, even those that were not in his field. Conversations with Lawrence Katz opened up new ways to improve my empirical methods and his sharp questions helped make my papers stronger.

I also benefitted from interactions with many of my classmates. The second chapter of the dissertation is coauthored with Johanna Mollerstrom, whose intuition and perseverance were invaluable assets. Thummim Cho, Wenxin Du, Anitha Sivasankaran, and Saranwut Takapong have been wonderful friends from first year. The days we shared at Littauer and Hark are one of the happiest memories I have at Harvard. I would also like to thank my colleagues Eunice Han, Joana Naritomi, Dana Rotz, Laszlo Sandor for their feedback on my work.

I greatly appreciate the generous financial support provided by Harvard Graduate School of Arts and Sciences and Samsung Scholarship. I have also received research grants from the Lab for Economic Applications and Policy.

I am indebted to my family for their continuous support. My parents, Joon Kook Hwang and Shil Rhee, raised me to become the person I am today and I could not have been here without their guidance. Chatting with my sister, Jiwon, always brightened me up. I thank her for making me laugh when I needed it most. Lastly, I thank my husband Seok Ki (Sean) Kim, who has always shown me much love and trust. He has gone through every up and down of graduate school with me, and experiencing the same process himself, has been my



greatest source of comfort and inspiration. Sean, thank you for being the best companion I could wish for.

# 1. Housewife, “Gold Miss,” and Equal: The Evolution of Educated Women’s Role in Asia and the U.S.

## 1.1 Introduction

Marriage rates have decreased among women in Japan, South Korea (hereafter Korea), Taiwan, Singapore, and Hong Kong during the past several decades. As covered in a recent article in *The Economist*, “The Asian avoidance of marriage is new, and striking. ... In South Korea, young men complain that women are on marriage strike.”<sup>1</sup> The majority of women on this “marriage strike” are highly educated, four-year college graduates. Koreans call this growing group of educated single women “Gold Misses.”<sup>2</sup>

Later marriages are common among the educated worldwide. What is striking about the phenomenon in Asia, however, is that Gold Misses are not merely delaying marriage. Rather, they are remaining single and at a much higher cost than in the West. Cohabitation is rare and out-of-wedlock childbirths make up less than 2 percent of total childbirths in Korea and Japan.<sup>3</sup> Moreover, the gap in marriage rates between college graduate and non-college graduate women has not diminished in Asia—it has grown. In the U.S., in contrast, the gap

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<sup>1</sup> *The Economist*, “The flight from marriage,” August 20th 2011.

<sup>2</sup> Terms have been coined in each region to refer to this group—in Korean *Gold Miss* (because they are “old misses” but highly educated and financially independent), in Japanese *Hanako-zoku* (literally “Hanako tribe,” named after the readers of the consumer magazine *Hanako*, which targets young single women) or *Wagamama* (translated as “single parasites” because most unmarried adults live with their parents), and in Chinese *Sheng-nu* (translated as “leftover women”). Among these, I choose to use the term Gold Miss throughout this paper.

<sup>3</sup> Korea and Japan are ranked the two lowest among OECD countries in out-of-wedlock childbirths. 38 percent of births are out-of-wedlock in the U.S. (OECD Family Database, 2011)

narrowed and reversed in the mid-1970s.<sup>4</sup>

Why are there Gold Misses and why are they increasing in developed Asia? This paper argues that the interaction of Asia’s rapid economic growth combined with the intergenerational transmission of gender attitudes causes the Gold Miss phenomenon. Wage growth creates incentives for more women to become educated and to participate in the labor market. However, gender norms do not shift at once; they are passed from one generation to the next. Men are still accustomed to women being housewives as in their mothers’ generation and have preference for wives’ household services. Thus, some educated women choose to remain single rather than marry “traditional” men.

The story sketched above emerges from a simple dynamic model of intergenerational transmission of gender attitudes, in which the fraction of men with preference for wives’ household time decreases with the fraction of educated women in the previous generation. Women’s education, marriage, and household time allocation decisions are functions of the endogenously evolving preferences within the male population.<sup>5</sup> The model predicts that Gold Misses are more likely to arise in economies that experience rapid, rather than gradual, growth in women’s wages.

To empirically evaluate this hypothesis, I use three different datasets. First, I use the Japanese General Social Survey to explore the gender attitudes and marriage patterns of Japanese men. Second, I use the American Time Use Survey to study time allocation at home among U.S. immigrants from Gold Miss countries. Lastly, I use the U.S. census data to analyze marriage patterns of men and women from two major Gold Miss countries—Korea and Japan.

I find evidence consistent with the implications of my model. First, men’s gender attitudes are affected by the economic status of women in their parents’ generation. Men in Japan

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<sup>4</sup> For references on the trends of U.S. college graduate women’s marriage and fertility, see for example, Kalmijn (1991), Goldin (2004), Schwartz and Mare (2005), Stevenson and Wolfers (2007) and Shang and Weinberg (2012).

<sup>5</sup> c.f., Fernández, Fogli, and Olivetti (2004).

who had working or college graduate mothers during childhood have more egalitarian views regarding gender roles, and are more likely to have working wives. Among U.S. immigrants from Gold Miss countries, U.S. born men spend about 3 hours per week more on housework relative to foreign born men while reducing their wives' time spent on housework.

Second, women marry “less traditional” men (rather than “traditional”) when they are available. In Japan, the probability that a college graduate man ever marries is positively correlated with his mother’s LFP. Among Koreans and Japanese residing in the U.S., foreign born women are 20 percentage points more likely than their male peers to marry a non-Korean or non-Japanese. I exploit regional variation in the composition of male population to show that Korean and Japanese women are more likely to marry out of their ethnic group when the foreign born share is higher among Korean and Japanese men.

Third, the increase in Gold Misses is less severe when the fraction of “less traditional” men in the marriage market is larger. In contrast to Korea and Japan, I find that college graduate Korean and Japanese women in the U.S. are as likely to be married as the non-college graduates.

The results indicate that educated women’s marriage prospects are better when the generation gap in women’s educational attainment (and LFP) is smaller. This offers new insight into the forces underlying the evolution of educated women’s role. Previous studies have focused on the supply-side determinants such as the introduction of the pill, the opening up of co-ed universities, and the advancements in household appliances technology.<sup>6</sup> These changes enabled the supply of educated and working women to increase in the marriage market. However, this paper demonstrates that an equally important determinant is the demand-side—whether men *want* educated and working wives who outsource housework—and thereby shows how women’s role may not transition smoothly from housewife to equal even with economic growth.<sup>7</sup> I also add to the line of research on cultural norms by providing

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<sup>6</sup> See for example, Goldin and Katz (2002), Greenwood, Seshadri, and Yorukoglu (2005), Greenwood and Guner (2009), and Goldin and Katz (2011).

<sup>7</sup> Feyrer, Sacerdote, and Stern (2008) share similar intuitions, although they do not present a formal model.

an example of how rigid gender roles may weaken in response to changes in women’s relative wages, and research on the assimilation of immigrants by explaining why there may be significant gender gaps in marital assimilation.<sup>8</sup>

The remainder of the paper is organized as follows. Section 1.2 provides an overview of the Gold Miss phenomenon with statistics from developed Asian countries. Section 1.3 presents the dynamic model. Section 1.4 lays out the empirical results. Section 1.5 concludes.

## 1.2 Background: The Gold Miss Phenomenon in Asia

Gold Miss (and analogous terms used in Asia, see footnote 2) colloquially means a never married woman in her thirties or older who has received at least a four-year college education, has her own career, and earns a higher-than-average yearly income. She is not just a “Miss,” she is a rich one. In order to use one general standard for different countries, in this paper I define Gold Miss as a *four-year college graduate woman over age 35 who has never married*.<sup>9</sup> The Gold Miss phenomenon then refers to the increase in the share of college graduate women who have never married relative to that of non-college graduate women.

The Gold Miss countries are the East Asian “tiger economies” that achieved economic miracles over the past half-century. Figure 1.1 depicts the historical trend of GDP per capita in Hong Kong, Japan, Korea, Singapore, and Taiwan in comparison to the U.S. and the world average from 1900 to present. The growth trajectories of the Asian economies

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Looking at cross-country differences in fertility rates, they argue that countries where women’s household status lags behind their labor market opportunities experience the lowest fertility rates.

<sup>8</sup> See for example, Giuliano (2007), Fernández and Fogli (2009), Alesina and Giuliano (2010), Alesina, Nunn, and Guiliano (2011), and Hwang (2013b) for discussions on the persistence of family culture. Regarding assimilation profiles by gender, Blau and Kahn (2007) study Mexican immigrants in the U.S. and find dramatic assimilation in labor supply for female immigrants.

<sup>9</sup> Age thirty-five is young enough to capture recent developments and old enough to distinguish between “marriage delayed” and “marriage forgone” among women in Asia. Despite the rise in women’s age at first marriage—29 in Japan and Korea, 28 in Taiwan, 30 in Hong Kong, and 28 in Singapore (Jones and Gubhaju, 2009)—marriage rates fall starkly once women reach their late thirties. The age-specific marriage rate for brides in age group 35–39 is only 12.2 (per thousand) in Korea and 9.2 (per thousand) in Japan (Statistics Korea, 2010 and Vital Statistics of Japan, 2009). This is not unrelated to the fact that female fertility drops sharply after age 35.

share a common pattern—rapid economic development from the 1960s onward (with growth rates in excess of 7 percent a year). The U.S. has had a higher GDP per capita than Asia since the early 20th century and follows a more gradual growth path throughout.

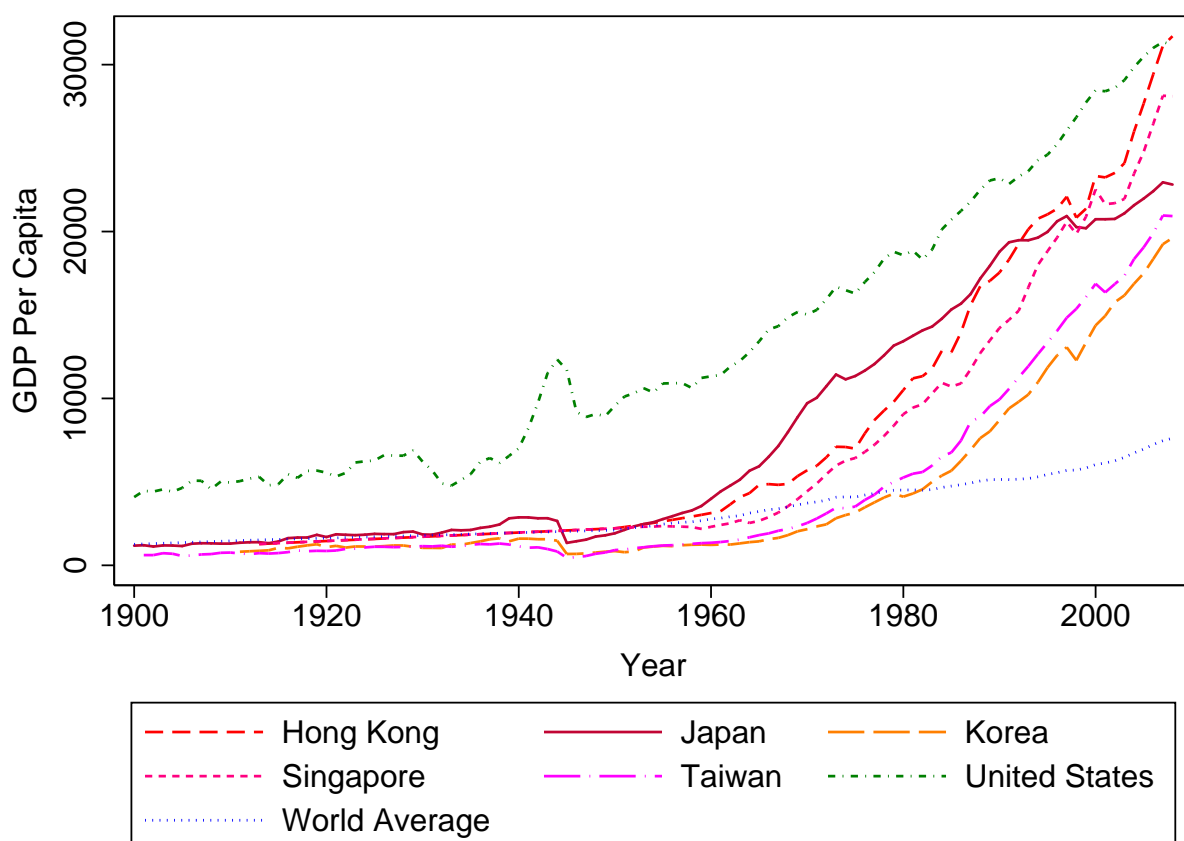


Figure 1.1: GDP Per Capita Trends of Developed Asian Countries

*Notes.* GDP per capita measured in 1990 international (Geary-Khamis) dollar units. Data are taken from Angus Maddison's Historical Statistics of the World Economy.

Asia's growth opened up (and benefited from) new opportunities for women. According to the United Nations statistics, labor force participation rates of women in the age group 25–34 in Japan, Korea, and Singapore increased by more than 17 percentage points from 1985 to 2006.<sup>10</sup> Educational attainment shows a similar pattern. There were virtually no college graduate women in East Asia before World War II but with economic development and

<sup>10</sup> The statistics for Japan, Korea, and Singapore in 1985 are 56.6 percent, 39.2 percent, and 58.3 percent, respectively. U.S. begins at around 70 percent and increased by 5 percentage points from 1985 to 2006.

education reforms, tertiary enrollments greatly increased. In Japan, although the college gender gap persists, women’s college enrollment rates rose from near zero in 1955 to 41 percent in 2007 (Basic School Survey). In Korea, women’s college enrollment rates increased from 20 percent to 55 percent in just 18 years and the college gender gap has disappeared (Statistical Yearbook of Education).

Despite the transformation in women’s LFP and education, marriage prospects for educated women in developed Asian nations have evolved quite differently from that of the West. Figure 1.2 depicts the fraction ever married among men and women in their late 30s in Hong Kong, Japan, Korea, Singapore, and the U.S. by education level. In all four Asian countries, higher education increases the marriage probability for men but lowers the marriage probability for women. The consequences are twofold: the least educated men are left single unless they “import” brides from, for example, developing South Asian countries, and highly educated women remain unmarried and become Gold Misses.<sup>11</sup> In the U.S., on the other hand, education has a positive relationship with marriage probability for both men and women.

The negative education gradient for women in Asia has even become steeper than in the past. Figure 1.3 plots the difference in fraction ever married between college graduates and non-college graduates in each birth cohort, among men and women over age 35 in Hong Kong, Japan, Korea, and the U.S.<sup>12</sup> Panel A shows that for men, college graduates’ marriage probabilities increased relative to non-college graduates.’ Panel B shows that for women, not only are college graduates less likely to be ever married than non-college graduates, but the gap has widened over time in Asian countries. For the most recent 1970s birth cohort, the

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<sup>11</sup> See Kawaguchi and Lee (2012) for a discussion about female migration from developing Asian countries to developed East Asian countries. They find that foreign brides currently comprise 4 to 35 percent of newlyweds in Japan, Korea, Singapore, and Taiwan although there is no raw sex ratio imbalance in these countries. Men with low socioeconomic statuses marry foreign women.

<sup>12</sup> Singapore and Taiwan do not provide Census micro-data. Including all individuals over age 35 may overstate the marriage rates of earlier cohorts since they are being observed at later ages than recent cohorts. The bias is expected to be relatively unimportant, however, since first marriages are rare once women reach their late thirties. (See footnote 9 for more detail.)

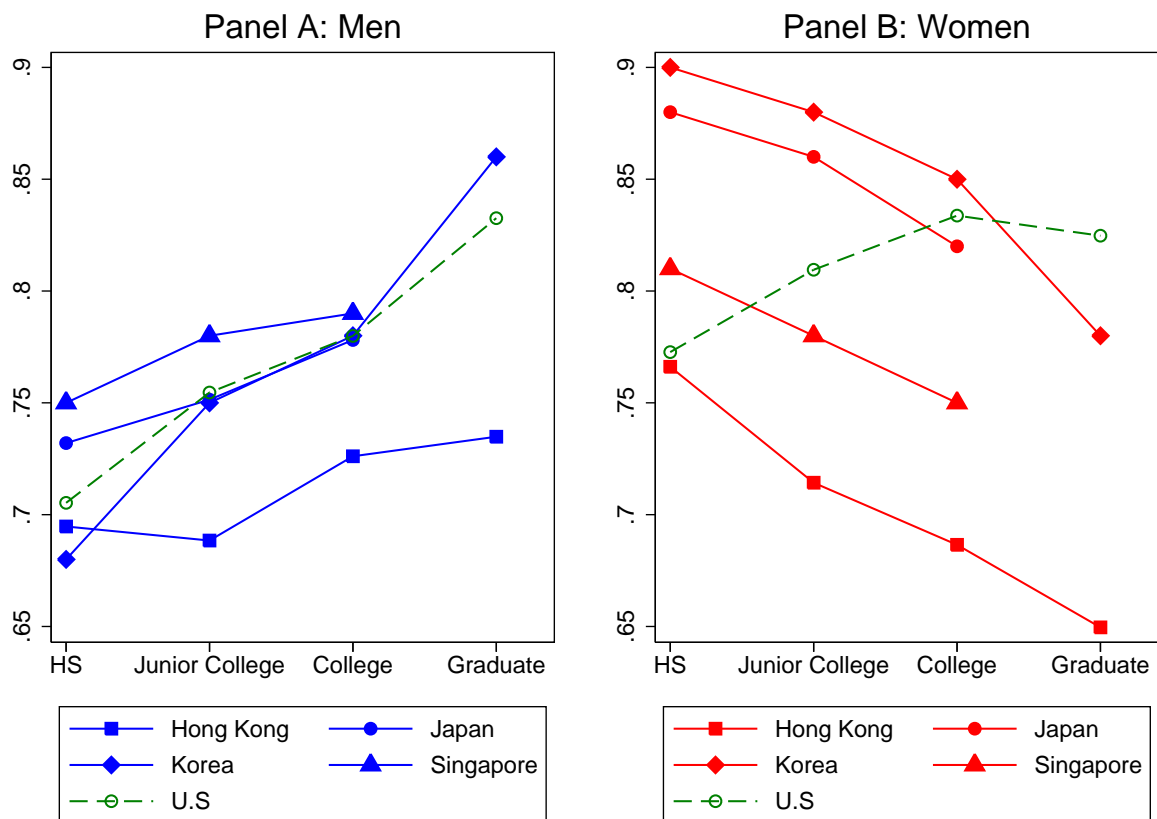


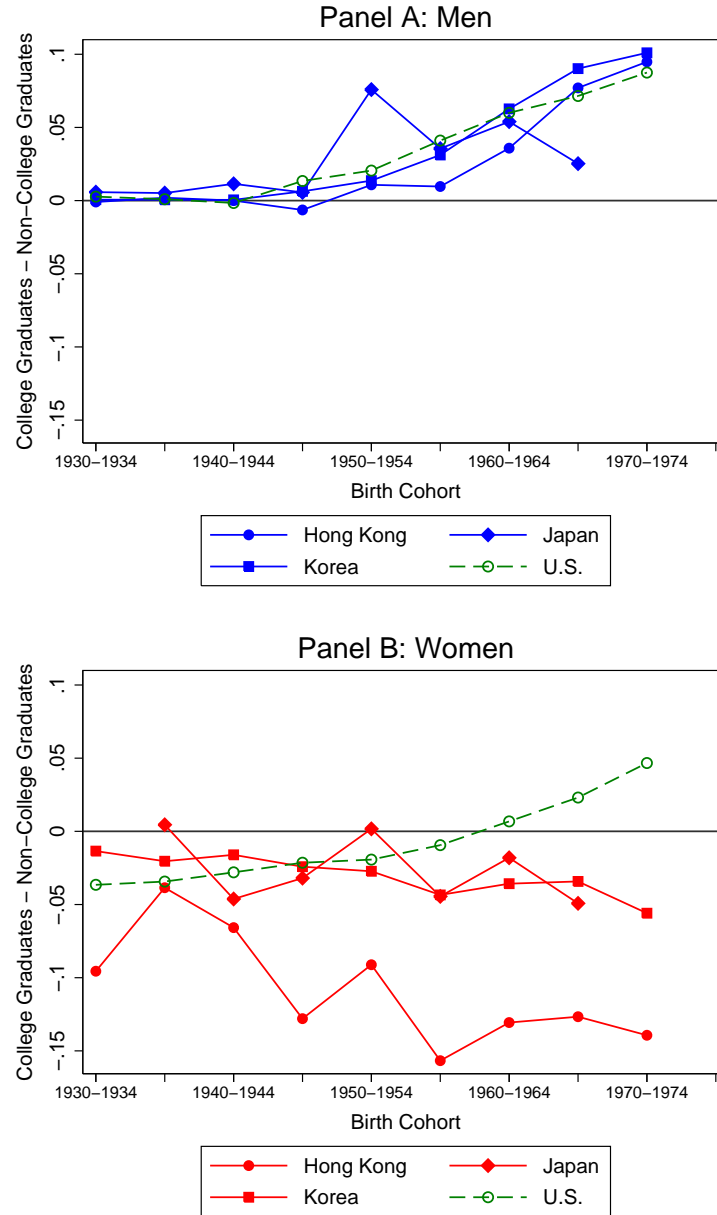
Figure 1.2: Fraction Ever Married by Sex and Education, Ages 35–39

*Notes.* Fraction ever married among men and women in age group 35–39 by educational attainment level in each country. Data are from the 2006 Hong Kong Population Census, the 2000 Japanese Population Census, summary tables from the 2010 Korean Population Census, Singapore’s “Population in Brief 2011,” and the 2010 American Community Survey. Each country has a different education system but I divide them into four common groups for comparison. High school refers to “Senior Secondary” schools in Hong Kong, high schools in Japan, Korea, and the U.S., and “Post-Secondary” schools in Singapore. Junior college refers to “Post-secondary (non-degree)” in Hong Kong, “Junior College/Vocational School” in Japan, less than four-year colleges in Korea and the U.S., and “Diploma & Professional Qualification” in Singapore. College refers to “Post-secondary (degree)” in Hong Kong and four-year universities in other countries. See Appendix A.1.2 for details. Since Japan and Singapore do not report separately for graduate school, “College” also includes those with more than a college degree in these countries.

difference amounts to 14 percentage points in Hong Kong and 5 percentage points in Japan and Korea. This contrasts with the upward slope in the U.S.: the difference in fraction ever married between college and non-college women has switched from negative to positive for American women.

How do the Asian college graduate women of earlier and later cohorts differ? One major





*Figure 1.3:* Difference in Fraction Ever Married Between College Graduates and Non-College Graduates, Over Age 35

*Notes.* Difference in the fraction ever married between college graduates and non-college graduates, among men and women over age 35 in each birth cohort. Data are from the 2006 Hong Kong Population Census, 2000–2008 Japanese General Social Survey, 1995 and 2000 Korean Population Census, 2012 Korean Economically Active Population Survey, and the 2010 American Community Survey. See Appendix A.1 for details. The 1965 cohort in Japan includes birth years 1965–1972 and the 1970 birth cohort in Korea includes birth years 1970–1976. College refers to four-year colleges in Japan, Korea and the U.S., and post-secondary (degree) levels in Hong Kong. I exclude respondents still attending school at the time of the survey.

difference is in their careers. College graduate women in Asia are now not only working but are also increasingly taking on professional full-time occupations once considered to be men's. For instance, only 19 percent of managerial/professional workers in Korea were female in 1971 but is now 41 percent (Economically Active Population Survey). The female-to-male median earnings of full-time employees in Japan increased from 45 percent in 1954 to 64 percent in 2006, and in Korea from 42 percent in 1975 to 67 percent in 2009. This contrasts with the earlier development in the U.S.—the ratio was 46 percent from as early as 1890.<sup>13</sup>

Women's new roles imply conflict for Asian families. Confucian ethics prescribe gender norms in all Gold Miss countries that for centuries described the ideal woman as a “good wife, wise mother.”<sup>14</sup> Despite the growing number of dual-earner households, the belief that women should be responsible for child rearing and housework continues. Arranged marriage has nearly disappeared but marriage is still considered a union of two families (rather than just the man and the woman). Hence, relatives and parents (in-laws) are continuously watching over the married couple's life. Pre-marital cohabitation and out-of-wedlock childbirths are socially stigmatized.

According to the 2005–2008 World Value Survey, the percentage of people who disagreed with the statement “When jobs are scarce, men should have more right to a job than women” is 66.4 percent in the U.S., but only 44.2 percent in Hong Kong, 17.9 percent in Japan, 26.4 percent in Korea, and 36 percent in Taiwan.<sup>15</sup> To the statement “It is more important for a wife to help her husband's career than to have one herself,” 70.4 percent of Americans disagreed (General Social Survey) whereas the percentage of respondents who disagreed is

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<sup>13</sup> Japanese data are from the Statistics and Information Department of the Ministry of Health, Labour, and Welfare. Korean data are from the 1975–2009 Occupational Wage Survey. See Goldin (1990) Table 3.2 for U.S. data.

<sup>14</sup> *ryōsai kenbo* in Japanese, *hyun mo yang ch'o* in Korean, and *xián qī liáng mù* in Chinese.

<sup>15</sup> Possible answers are (1) Agree, (2) Disagree, and (3) Neither. (Don't know and missing are excluded.) The sample size for each country is U.S. 1,238, Hong Kong 1,225, Japan 1,042, Korea 1,197, and Taiwan 1,226. No statistics are available for Singapore on this question.

less than half of that in Asia—22.9 percent in Japan, 35 percent in Korea, and 31.2 percent in Taiwan (East Asian Social Survey).<sup>16</sup>

Time Use Survey findings confirm these beliefs. Among dual-earner households, women’s average time spent on household activities is at least 2 hours (per day) longer than men’s in Japan and Korea (Japanese Time Use Survey, 2006 and Korean Time Use Survey, 2009).<sup>17</sup> Gender gap exists in the U.S. as well, but the magnitude is much smaller—50 minutes per day (American Time Use Survey, 2003–2011).

There is virtually no difference in household appliances technology between the Gold Miss countries and other developed countries. The relative price of hiring a live-in domestic worker in the U.S. and in East Asia is also comparable, at about 40 percent of the mean wage of native college graduate women. In fact, the price is lower in Taiwan and Singapore, and particularly lower in Hong Kong, than in the U.S.<sup>18</sup>

Thus, although the Gold Miss phenomenon may look similar with what occurred in the U.S. and elsewhere when women first began to graduate from college, there are important differences. In the early twentieth century, women could not easily have both family and career with the (lack of) contraceptive methods, household appliances technology, market substitutes for household production, and labor market opportunities (Goldin, 2004). As surveyed in this section, women in developed Asia today do not face these conditions. Rather, the constraints of marriage derive from traditional household roles families expect from the wife and daughter-in-law.

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<sup>16</sup> Possible answers are (1) Strongly agree, (2) Agree, (3) Disagree, and (4) Strongly disagree in the GSS and (1) Strongly agree, (2) Fairly agree, (3) Somewhat agree, (4) Neither agree or disagree, (5) Somewhat disagree, and (6) Strongly disagree in the EASS. (Don’t know and missing are excluded.) The sample size for each country is U.S. 13,748, Japan 2,130, Korea 1,605, and Taiwan 2,102. Singapore and Hong Kong are not included.

<sup>17</sup> See Appendix A.1 for information on these datasets.

<sup>18</sup> Hong Kong has a foreign domestic worker (FDW) program and the government sets the minimum wage for these workers. According to Cortes and Pan (2013), the minimum wage is more than four times lower than high skilled women’s wage. Though limited, Taiwan and Singapore have similar programs; the FDW’s wage is about 30–40 percent of native college graduate women’s. Japan and Korea have stricter immigration policies. The relative price of live-in domestic workers is nearly half of native college graduate women’s wage, as in the U.S. (See Huang, Yeoh, and Rahman, 2005 for more information on foreign domestic workers.)

### 1.3 *Model of the Intergenerational Transmission of Gender Attitudes and of Marriage*

Building on the framework of Fernández, Fogli, and Olivetti (2004), I develop a simple dynamic model where women’s education, marriage, and labor force participation decisions are functions of wages and the endogenously evolving types within the male population—“traditional” and “modern.” I define a man as traditional if he has preference for his wife’s household services and modern if he is willing to substitute wife’s housework with his own or with market goods and services. The fraction of modern men increases with the fraction of educated women in the previous generation.

When women’s wages rise, more women choose to stay single than marry traditional husbands. The key distinguishing prediction of this model is the path dependency of the Gold Miss phenomenon. Given that men initially hold traditional values, economies where women’s wages increased rapidly are more likely to experience the Gold Miss phenomenon compared with economies where women’s wages increased gradually over time. In the rapid case, a large discrepancy appears between the women’s roles when men were growing up and women’s roles in their own cohort. As a result, there are not enough modern men for the newly educated women to marry.<sup>19</sup>

I make the following assumptions for tractability. Women differ in their effort costs of becoming educated and can choose to invest in education (“educated,”  $E$ ) or not (“uneducated,”  $U$ ). If a woman invests in her education, she gets wage  $w_E$  in the labor market, which is higher than the wage she would get if uneducated,  $w_U$ .  $w_E$  is randomly drawn from a distribution that varies exogenously over time. Men, on the other hand, are assumed to

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<sup>19</sup> Standard models of household production can also show that growth in women’s earning power reduces the gain from marriage or that positive assortative mating becomes optimal as technology advances (Becker, 1991). However, they cannot explain why marriage patterns would evolve differently across similarly developed countries. Intra-household models also face this limitation if bargaining power is a function of only wages. (See Chiappori and Donni, 2011 for a survey of this literature.) Assuming that the sharing rule is affected by other “distribution factors,” in which gender attitudes can be a component, is an option. The difference with my model would then be that the husband’s type affects the wife’s utility via consumption.

have homogeneous skill level and earn  $w_m$  in the labor market.<sup>20</sup> Men differ in their cultural upbringing: those who grew up around educated women develop less traditional gender attitudes (“modern,”  $M$ ) compared with those who grew up around housewives (“traditional,”  $T$ ). All agents are rational and forward-looking.

The timing in the model is as follows. In the first period, women decide whether or not to become educated. In the second period, men and women are randomly matched and decide whether to get married or remain single. In the third period, men and women decide on a time allocation between market activity and household production. Below I describe the intergenerational dynamics and then solve for each stage of the decision-making process.

### 1.3.1 Intergenerational Dynamics

Gender attitudes (or more specifically, men’s preferences for wives’ household services) are transmitted from mother to son. Assuming, as is reasonable for Asia, that only married women have children, the fraction of modern men ( $\lambda_M$ ) in cohort  $t$  then depends on the fraction of married educated women in the previous cohort. The dynamics of the system are thus given by:

$$\lambda_{Mt+1}(\lambda_{Mt}) = p_{Et}(\lambda_{Mt})\lambda_{Et}(\lambda_{Mt}) \quad (1.1)$$

where  $p_{Et}$  is the marriage probability of educated women and  $\lambda_{Et}$  is the fraction of educated women at  $t$  (both are functions of  $\lambda_{Mt}$ ).<sup>21</sup>

This intergenerational linkage can be supported by at least two different mechanisms. First, parents exert a direct socialization effort to influence their children’s process of preference formation. This is similar to the idea of “direct vertical socialization” discussed in

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<sup>20</sup> If men also differed in their educational attainment and wages, there would be four categories of men, with the modern and educated being the most attractive husband and the traditional and uneducated being the least attractive. Figure 1.2 Panel A and Kawaguchi and Lee (2012) address this outcome. Since my paper’s focus is on the Gold Misses, I do not add the education dimension to men. But the traditional and uneducated men not being able to marry is a by-product of the Gold Miss phenomenon, and can thus be explained by the same mechanisms addressed here.

<sup>21</sup>  $p_{Et}$  is defined in equation (1.6) below. How  $\lambda_{Et}$  is endogenously determined is discussed in Section 1.3.4.

Bisin and Verdier (2000). Educated mothers teach their sons that a family can function well with substitutes of her time.

Second, people tend to imitate others and like those who are similar to themselves, as is well-documented in research on peer effects, discrimination, and social norms.<sup>22</sup> Even if mothers do not teach specific values to their children, boys are likely to emulate their parents or other role models when they form their own families.<sup>23</sup>

Whichever mechanism is at work (or most likely, a combination of these mechanisms), the dynamics can be expressed as equation (1.1) in reduced form.<sup>24</sup> Note that since preferences are formed during childhood, men cannot freely choose to be one type or the other (the cost of changing one's attitudes is very high).

### 1.3.2 Household Decision

All individuals are endowed with a unit of time. Within a married household, each spouse decides how much time  $t$  to allocate to market activity; the remaining time  $(1 - t)$  is allocated to household production. Market activity yields a marginal return (wage) of  $w_m$  for men and  $w_f$  for women, where I assume  $w_m > w_f$ .<sup>25</sup> Time allocations are a Nash equilibrium of a game in which each spouse decides his or her time allocation taking as given

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<sup>22</sup> See for example, Becker (1957) and Akerlof and Kranton (2000).

<sup>23</sup> Similar effects may exist for girls as well: girls who grew up in male-breadwinner households may be more traditional than those who grew up in dual-earner households. For example, Olivetti and Patacchini (2012) study how women's working behavior is influenced by the working status of their mothers and their childhood friends' mothers using the National Longitudinal Survey of Adolescent Health. However, when economic growth creates opportunities for girls that did not exist for their mothers, girls are no longer constrained to traditional roles. Thus, given the time frame of my model—the past century during which women's wages increased greatly—the intergenerational transmission plays a much smaller role (on net) for girls than for boys. Section 1.4.1 presents supportive evidence (see footnote 40).

<sup>24</sup> I do not take a stance on the specific mechanism as I do not attempt to distinguish between them in my empirical work.

<sup>25</sup> When  $w_f$  is higher than  $w_m$ , the wife works full-time whereas the husband works part-time ( $t_f = 1, t_m = 1 - \frac{2\beta}{w_m}$ ). When  $w_f$  becomes sufficiently higher,  $\nu_f$  intersects with  $V_{fM}$ . After that point, an educated woman would choose not to marry even the modern type because the gain from consuming her income all by herself becomes larger than the gain from having a husband doing housework. In all countries, however, women's wages are still lower than men's, and hence I abstract from this case.

the time allocation of the other partner. (Results do not depend on this specification. See Appendix A.2.1.)

The welfare of a married individual consists of utility from consumption and utility from household public goods. Consumption is derived from total household earnings,  $w_m t_m + w_f t_f$ , which is split equally between the couple. The household public good is a function of the total time invested in household production,  $(1 - t_m) + (1 - t_f)$ , and  $\beta > 0$  is the value of the public good to each individual.

The utility function of a man  $m$  married to a woman  $f$  is:

$$V_m(w_m, w_f) = \max_{0 \leq t_m \leq 1} \frac{1}{2}(t_m w_m + t_f w_f) + \beta \log((1 - t_m) + (1 - t_f)) \quad (1.2)$$

where he takes  $t_f$  as given. Men's utility function depends only on wages.

On the other hand, the utility function of a married woman  $f$  also differs by husband's type  $j = M, T$ :

$$V_{fj}(w_m, w_f) = \max_{0 \leq t_f \leq 1} \frac{1}{2}(t_m w_m + t_f w_f) + \beta \log((1 - t_m) + (1 - t_f)) - (\alpha_0 + \alpha_1(t_f))I_{j=T} \quad (1.3)$$

where  $I_{j=T}$  is an indicator for whether husband is traditional type. That is, a married woman incurs a direct disutility of  $\alpha_1(t_f)$ , which is an increasing function of  $t_f$ , and a fixed amount of  $\alpha_0$  if her husband is traditional.<sup>26</sup> For analytical purposes, let  $\alpha_1(t_f)$  be an indicator function:  $\alpha_1 > 0$  when  $t_f > 0$  and  $\alpha_1 = 0$  when  $t_f = 0$ . Emotional gain from marriage may be reduced when the husband and in-laws are traditional, due to increased marital tensions, pressure to take better care of family members or to quit her job, or domestic violence.<sup>27</sup>

Note that the share  $\frac{1}{2}$  is not affected by male type. That is, a traditional husband does

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<sup>26</sup> See Appendix A.2.1 for a discussion on how the model changes when the disutility term is only in the men's utility function.

<sup>27</sup> Refer to Section 1.2 to see cross-country variation in responses to stylized gender role questions. Research on the relationship between husbands' gender attitudes and the quality of marital relations provide further evidence. See for example, Hochschild (1989), Min (2001), and Rubin (1983).

not “steal” more from his wife than a modern husband, and hence there is financial benefit from marriage regardless of the husband’s type. This is a conservative assumption; if the share also depends on the husband’s type such that women married to traditional men get less than half, this would make traditional men even less attractive as partners (see footnote 19). Men’s productivity at home is also assumed to be the same. The willingness to engage in household tasks may differ (and hence be incorporated in the disutility term), but it is unlikely that there are fundamental differences across men in their ability to do them.

The first order conditions of equations (1.2) and (1.3) when the husband is a modern type yield:

$$\begin{cases} 2 - t_m - t_f = \frac{2\beta}{w_m} \\ 2 - t_m - t_f = \frac{2\beta}{w_f} \end{cases}$$

respectively. Because  $w_m \neq w_f$ , at least one of the agents must be at a corner solution. There are two possible cases: (i) when  $w_f \leq 2\beta$ ,  $t_m = 1$  and  $t_f = 0$ , (ii) when  $w_f > 2\beta$ ,  $t_m = 1$  and  $t_f = 1 - \frac{2\beta}{w_f}$ . It is always optimal for married men to work full-time regardless of women’s wages because men’s wages are higher than women’s. A married woman becomes a housewife in case (i) but works part-time in case (ii).<sup>28</sup> Henceforth, I assume for clarity that uneducated women’s wages are lower than  $2\beta$  and educated women’s wages are higher than  $2\beta$ .

When the husband is a traditional type, because of the disutility term  $\alpha_1(t_f)$ , the wife starts to work at a wage higher than  $2\beta$ .<sup>29</sup> I denote this threshold wage as  $\underline{w}_E$ .

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<sup>28</sup> Outcomes are not assumed to be Pareto efficient ex-ante. Case (i) turns out to be Pareto efficient but (ii) is not when  $w_f$  is high enough to allow an educated woman to reject a traditional man. A Pareto improvement is then possible if the traditional man offers her a “bribe” to compensate her for the disutility she incurs from marrying him. Whether this can be a binding contract is highly questionable, however. The contract would require the husband to allow his wife to consume more than half the total income, and this would not be time-consistent if the traditional man could renege once the educated woman is married to him (and there is a non-trivial cost of divorce).

<sup>29</sup>  $\alpha_0$  is a level effect, and hence does not affect the threshold wage itself.



An individual's utility when single is defined analogously.<sup>30</sup>

$$\nu_i = \max_{0 \leq t_i \leq 1} w_i t_i + \beta \log(1 - t_i) \quad (1.4)$$

The optimal time allocation is  $t_i = 0$  when  $w_i \leq \beta$  and  $t_i = 1 - \frac{\beta}{w_i}$  when  $w_i > \beta$ . I assume that household production is valued such that  $V_m(w_m, w_U) \geq \nu_m$  (i.e. men prefer to marry a housewife than to remain single).

### 1.3.3 Marriage Decision

Matching is done as a one-period random search in which the probability of meeting another individual (of a different sex) of type  $j$  is given by the fraction of type  $j$  in the population.<sup>31</sup> Hence the probability that a woman is matched to a modern type is  $\lambda_M$  and the probability that she is matched with a traditional type is  $1 - \lambda_M$ . Individuals decide whether to stay in a match (that is, marry) and obtain utility  $V_{ij}$  as in equations (1.2) and (1.3) or to remain single and obtain utility  $\nu_i$  as in equation (1.4). An individual  $i$  chooses to marry  $j$  if and only if  $V_{ij} \geq \nu_i$  holds.

$V_m(w_m, w_U) \geq \nu_m$  implies that men marry educated women as well as uneducated women, since  $V_m$  increases in  $w_f$ . A woman's marriage decision depends on her wage and the type of man she is matched to. If matched to a modern type, she chooses to marry. But if matched to a traditional type, she may prefer to remain single when her wage is sufficiently high. Given the disutility term,  $\nu_f > V_{fT}$  is possible as  $w_f$  rises because the marginal return from

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<sup>30</sup> Alternatively, I can assume that the value of household production is smaller for unmarried agents (i.e. smaller than  $\beta$ ) if for instance, children are the main source of utility in household public goods and unmarried agents do not have children. I keep the same  $\beta$  as in equations (1.2) and (1.3) to keep the algebra as simple as possible.

<sup>31</sup> Allowing individuals who are unmarried after the first round to redraw does not make any difference in the fraction and type of men and women who remain single, because only educated women and traditional men would remain. A directed search model would yield a higher fraction of married agents in the population, because modern men prefer educated women to uneducated women ( $V_m$  increases in  $w_f$ ). However, a directed search model would require all women to correctly anticipate ex-ante what fraction of her contemporaries would choose to become educated.

one's wage is higher when it is not shared with a spouse.

Denote the woman's wage at which  $\nu_f$  intersects with  $V_{fT}$  as  $\tilde{w}_E$ . Depending on the relative size of  $\alpha_0$  and  $\alpha_1$ , I then get the following relationship between  $\underline{w}_E$ ,  $\tilde{w}_E$ , and  $w_m$ :

**Proposition 1.**

$$\beta \log 2 < \alpha_0 + \alpha_1 < \frac{1}{2}(w_m - \underline{w}_E) + \beta \log 2 \quad (1.5)$$

*When  $\alpha_0$  and  $\alpha_1$  satisfy equation (1.5),  $\underline{w}_E < \tilde{w}_E < w_m$ . When they are larger,  $\tilde{w}_E < \underline{w}_E < w_m$ . When they are smaller,  $\underline{w}_E < w_m < \tilde{w}_E$ .*

(The proof for this and all other propositions can be found in Appendix A.2.2.)

In words, if the disutility from having a traditional husband is too large, all educated women will decide to stay single when matched to traditional men. On the other hand, if the disutility is small, then all women will choose to marry even when they are matched to traditional men. In the intermediate case where  $\alpha_0$  and  $\alpha_1$  satisfy equation (1.5), an educated woman's marriage decision changes as her outside option improves. I focus on this last, non-trivial case. Assume that equation (1.5) holds and that  $\alpha_0 \leq \beta \log 2$ , so that  $\alpha_1$  is strictly larger than zero.

An implication of this search model is that when  $w_E < \tilde{w}_E$ , women's marriage probabilities are invariant to the fraction of modern men in the marriage market because all women choose to marry. Thus, uneducated women always marry. When  $w_E \geq \tilde{w}_E$ , however, educated women matched to traditional types do not marry because  $\nu_f > V_{fT}$ . An educated woman with a high enough wage need not tolerate a traditional husband for the sake of his income.

Therefore, the expected marriage probability  $p_i$  of uneducated ( $U$ ) and educated ( $E$ ) women can be expressed as in equation (1.6), given that educated women randomly draw

wages from  $W(\cdot)$  with support  $(2\beta, w_m)$ .<sup>32</sup>

$$\begin{cases} p_U(\lambda_M) = 1 \\ p_E(\lambda_M) = \int_{2\beta}^{\tilde{w}_E} 1dW + \int_{\tilde{w}_E}^{w_m} \lambda_M dW \end{cases} \quad (1.6)$$

Consequently, a woman's expected utility conditional upon her educational attainment can be expressed as:

$$\begin{cases} V_U(\lambda_M) = \lambda_M V_{UM} + (1 - \lambda_M) V_{UT} \\ V_E(\lambda_M) = \int_{2\beta}^{\tilde{w}_E} (\lambda_M V_{EM} + (1 - \lambda_M) V_{ET}) dW + \int_{\tilde{w}_E}^{w_m} (\lambda_M V_{EM} + (1 - \lambda_M) \nu_f) dW \end{cases} \quad (1.7)$$

where  $V_{fj}$  and  $\nu_f$  are as defined in equations (1.3) and (1.4).

#### 1.3.4 Education Decision

I assume that each woman faces an idiosyncratic effort cost  $e$  of becoming educated, where  $e$  is an iid random draw from a continuous cumulative distribution function  $G(\cdot)$ . Let

$$\widehat{e}(\lambda_M) \equiv V_E(\lambda_M) - V_U(\lambda_M) \quad (1.8)$$

be the expected utility differential between an educated and uneducated woman given the fraction of modern men,  $\lambda_M$ . Because wages are exogenous,  $\widehat{e}(\lambda_M)$  is independent of the fraction of women who decide to become educated.<sup>33</sup>

$\widehat{e}(\lambda_M)$  has the following properties:

**Proposition 2.**  *$\widehat{e}(\lambda_M)$  is an increasing function of  $\lambda_M$ , and  $\widehat{e}(\lambda_M) \geq 0$  always holds.*

Since all women with effort cost  $e \leq \widehat{e}(\lambda_M)$  decide to invest in education, the equilibrium

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<sup>32</sup> See Appendix A.2.1 for a discussion on how wages may instead be proportionate to the effort exerted such that a greater  $e$  generates a better wage distribution.

<sup>33</sup> I abstract from general equilibrium effects on wages.

$\lambda_E(\lambda_M)$ —fraction of educated women—at any point in time is:

$$\lambda_E(\lambda_M) = G(\hat{e}(\lambda_M)) \quad (1.9)$$

It follows directly from Proposition 2 that  $\lambda_E(\lambda_M)$  is also a continuous, increasing function of  $\lambda_M$  on  $[0, 1)$ .  $\lambda_E = 1$  (and therefore  $\lambda_M = 1$ ) is ruled out, because  $e$  can be unboundedly large. In words, more women find it worthwhile to invest in education when there is a larger fraction of modern men because marriage prospects are better. But it is never the case that all women become educated because there are always a few whose cost of investing in education is very high.

### 1.3.5 Shock to Women's Wages and the Gold Miss Phenomenon

There are equal numbers of men and women in the society. Let the number of educated women at period  $t$  be denoted as  $F_{Et}$ :

$$F_{Et} \equiv \lambda_{Et}(\lambda_{Mt})F_t \quad (1.10)$$

where  $F_t$  is the total number of women at  $t$ . The conditional probability of being unmarried when educated (being a Gold Miss), is simply  $1 - p_E(\lambda_{Mt})$ , where  $p_E(\lambda_{Mt})$  is the marriage probability of educated women as defined in equation (1.6).

$W_t(\cdot)$  is the continuous cumulative distribution function of educated women's wages in generation  $t$  over support  $(2\beta, w_m)$ . The following comparative statics can be made with regards to contemporaneous wages:

**Proposition 3.** *Given  $W_{t-1}(\cdot)$  and  $\lambda_{Mt-1}$ , if the distribution  $W_{t1}(\cdot)$  first-order stochastically dominates  $W_{t2}(\cdot)$ ,  $F_{Et1} \geq F_{Et2}$ .*

**Proposition 4.** *Given  $W_{t-1}(\cdot)$  and  $\lambda_{Mt-1}$ , educated women's marriage probability is an increasing function of  $W_t(\tilde{w}_E)$ . Hence if the distribution  $W_{t1}(\cdot)$  first-order stochastically*

dominates  $W_{t2}(\cdot)$ ,  $p_{Et1} \leq p_{Et2}$ .

That is, both the number of educated women and the probability that they remain unmarried are increasing in educated women's current wages. Proposition 3 is straightforward; more women are incentivized to invest in education when the returns to education are greater. Proposition 4 results because women with wages higher than  $\tilde{w}_E$  can afford to stay single when matched to traditional men.

More important, however, is whether the probability of becoming a Gold Miss increases or decreases as wages rise *over time*, i.e.  $p_{Et} - p_{Et-1}$ .<sup>34</sup>

**Proposition 5.** *Suppose  $W_t(\cdot)$  first-order stochastically dominates  $W_{t-1}(\cdot)$  at all  $t$ . The decrease in  $p_E$  from  $t - 1$  to  $t$  is larger when (i) the drop in  $W(\tilde{w}_E)$  from  $t - 1$  to  $t$  is larger and (ii) the shift in  $W(\cdot)$  from  $t - 2$  to  $t - 1$  is smaller.*

That is, the Gold Miss phenomenon is more likely to arise in economies where there was a large, one-time shock to women's wages than in those that had a more gradual wage growth.

To understand why this is so, notice that wage increase affects  $p_E$  in two opposite directions. First, there is the contemporaneous effect: higher wages allow educated women to remain single when matched to traditional type and thus *lowers* marriage probability (Proposition 4). On the other hand, more women have an incentive to become educated when wages are high (Proposition 3) and this generates a larger fraction of modern males in the next generation. This intergenerational effect *raises* educated women's marriage probability by increasing the pool of marriageable men. The second effect, unlike the first, is lagged.

Condition (i) in Proposition 5 enlarges the first effect whereas condition (ii) curtails the second, resulting in the Gold Miss phenomenon. But if either of the conditions fail to hold, the two opposing effects come into play and  $p_{Et}$  may fall only slightly relative to  $p_{Et-1}$ , or may even increase.

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<sup>34</sup> Since uneducated women always marry,  $p_{Ut} - p_{Ut-1} = 0$ .

In sum, the Gold Miss phenomenon should be best observed when there is a shock to women's wages in a country with a large fraction of traditional men. The key observation is that the results do not depend on societies being endowed with different types of men. Even if all countries had equally traditional men at  $t = 1$  and the same wage level at  $t = T$ , mismatch in the marriage market would be a function of how rapidly the economy grew *between*  $t = 1$  and  $t = T$ . Therefore, similarly developed countries at  $t = T$  can have very different gender norms, which in turn dictates the variation in the degree of mismatch we observe in the marriage market.

Finally, it is worth noting that this path dependency feature may result in prolonged repercussions, well beyond the arising of the Gold Miss phenomenon. Countries may become "stuck" in the Gold Miss equilibrium because as long as the Gold Misses do not have children, they cannot contribute to producing a new cohort of modern males (equation (1.1)). But if the fraction of modern men depends on the fraction of *all* educated women in the previous cohort (regardless of marital status), then the fraction of modern men would increase greatly after the Gold Miss generation.

#### *1.4 Evidence on the Effect of Cultural Transmission on the Gold Miss Phenomenon*

I focus my empirical exploration of the model on four testable implications. First, men who grew up around highly educated women are less traditional than those who grew up around less educated women. Second, husband's type affects household time allocation; a woman is more likely to work in the labor market when her husband is a modern type. Third, women marry less traditional men (rather than traditional) when they are available. Fourth (and as a consequence of the prior points), the Gold Miss phenomenon is less severe when there is a larger fraction of modern men in the marriage market.

The ideal way to test these predictions would be to exogenously vary wage growth paths

or the composition of male types within an initially traditional country and then see how the marriage market unfolds generations later. Because this is not feasible, I use three different datasets—the Japanese General Social Survey, the U.S. Census and the American Community Survey, and the American Time Use Survey—to test the four elements above.

#### *1.4.1 Gender Attitudes and Marriage Patterns in Japan*

I first analyze the Japanese General Social Survey (JGSS) to evaluate how a mother’s education and employment affect her son’s gender attitudes and marriage patterns in one of the Gold Miss countries—Japan.

#### *Data*

The JGSS is designed to solicit political, sociological, and economic information from men and women living in Japan and has been conducted seven times during the 2000s.<sup>35</sup> I pool these years for the analyses. The sample size is about 3,500 per year. Observations are weighted to make the sample representative of the Japanese population.<sup>36</sup> Respondents younger than 25 or still attending school are excluded in order to obtain more accurate data on final education. Appendix Table A.1 contains descriptive statistics of the key variables.

#### *Results*

My model rests on the notion that gender norms are subject to change and that men’s views of gender roles are influenced by their mothers. I investigate this using individual’s responses to five questions in the JGSS specifically designed to capture gender attitudes.

Respondents are asked whether they agree or disagree with the following statements: “If a husband has sufficient income, it is better for his wife not to have a job,” “Men should cook and look after themselves,” “A husband’s job is to earn money; a wife’s job is to look

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<sup>35</sup> 2000, 2001, 2002, 2003, 2005, 2006, and 2008.

<sup>36</sup> See Appendix A.1.3 for how the weights are constructed.

after the home and family,” “A preschool child is likely to suffer if his/her mother works,” and “It is more important for a wife to help her husband’s career than to have one herself.” An individual can be defined as less traditional if he/she agrees with the second statement, and disagrees with the other statements.<sup>37</sup>

To investigate whether the mother-to-son transmission exists, I estimate the following linear probability model:

$$Y_{ist} = \beta_0 + \beta_1 X_{ist} + \beta_2 MomLFP_{ist} + \beta_3 MomColl_{ist} + \gamma_t + \delta_s + \varepsilon_{ist} \quad (1.11)$$

where the dependent variable  $Y_{ist}$  is an indicator variable that equals 1 if the response to the specific question (listed above) is less traditional for a man  $i$  who lives in region  $s$  and belongs to cohort  $t$ .  $MomLFP_{ist}$  equals 1 if his mother had a paying job when he was about 15 years old, and  $MomColl_{ist}$  equals 1 if his mother is a college graduate.<sup>38</sup>  $X_{ist}$  represents a set of demographic controls such as respondent’s age, education, and income. In addition to regional and urban dummies  $\delta_s$ , I include cohort fixed effects  $\gamma_t$  to take into account time trends.<sup>39</sup>

Table 1.1 contains the estimation results. The coefficients on having had a working and college graduate mother are always positive, and are statistically significant in cols. 1, 3, and 4. The probability that a man disagrees with the statements “If a husband has sufficient income, it is better for his wife not to have a job,” “A husband’s job is to earn money; a

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<sup>37</sup> Responses to these five statements differ by sex and cohort. I find that women are always less traditional than men and the gap is larger in recent cohorts. Also, there has been a significant evolution of beliefs for both men and women over time. Those who were born after 1960 responded less traditionally to at least one or two more statements compared with those born in the 1920s.

<sup>38</sup> The JGSS asks “When you were about 15 years old, did your mother have any paying job? If so, what did she do?”  $MomLFP_{ist}$  is zero for those who answered “She was not working.” Respondents who “Don’t know” or did not have a mother at that time are excluded.  $MomColl_{ist}$  equals 1 for four-year colleges (not junior college or college of technology).

<sup>39</sup> There are 47 prefectures in Japan, which are governmental bodies larger than cities, towns, and villages. The prefectures are grouped into six regions (“blocks”) in the JGSS. Urban is a set of three dummies for the size of municipality—largest cities, other cities, and town/village. Largest cities are the “Cabinet-Order designated cities” that have more than 500,000 people.



wife’s job is to look after the home and family” and “A preschool child is likely to suffer if his/her mother works” increases by about 5 percentage points if his mother worked relative to if his mother did not work when he was young and by more than 10 percentage points if his mother is a college graduate. These are comparable in magnitude to the marginal effect of the respondent himself being college graduate. Father’s educational attainment, on the other hand, has no statistically significant effect. The results are robust to restricting the sample to currently married men.<sup>40</sup>

If men who had working and/or college graduate mothers are indeed less traditional, are they more likely to be married than men who had housewife mothers? And are their wives more likely to work after marriage?

To address these questions, in Table 1.2, I look at the correlation between a mother’s background and her son’s marriage probability (cols. 1-2) and her daughter-in-law’s LFP (cols. 3-4). Col. 1 shows that there is a small but positive relationship between a mother’s LFP and her son’s marriage probability. To reduce the bias from potential correlations between a mother’s work status and her son’s ability, and since the model focuses on the case where men’s wages are higher than women’s, I run the regression for just the college graduate men in col. 2. I find that mother’s LFP has a larger positive effect than when all men are considered. As for mother’s educational attainment, the coefficient is positive although statistically insignificant. Thus, a man’s likelihood of marriage is higher if his mother worked or is a college graduate.

Cols. 3-4 of Table 1.2 present the results from estimating equation (1.11) with wife’s current labor force participation (measured by whether she had any paying job in the last week) as the dependent variable. Having a college graduate mother does not have a statistically significant effect on wife’s probability of working. But a man having had a working mother

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<sup>40</sup> When I replicate this analysis for *female* respondents, I find that both mother’s LFP and mother being a college graduate do not have statistically significant effects on women’s gender attitudes. Consistent with the model’s assumption, the intergenerational transmission of gender attitudes matters more for men than women.

Table 1.1: Effect of Mother's LFP and Education on Gender Attitudes, Men in Japan

View on:	Dependent variable=1 if less traditional				
	Wife job (1)	Men housework (2)	Wife's role (3)	Working mother (4)	Wife career (5)
Mother's LFP at age 15	0.064*** (0.019)	0.019 (0.015)	0.043** (0.019)	0.050*** (0.019)	0.017 (0.019)
Mother college graduate	0.145** (0.062)	0.012 (0.039)	0.104* (0.062)	0.211*** (0.054)	0.080 (0.060)
Father college graduate	-0.035 (0.031)	0.014 (0.022)	-0.025 (0.031)	-0.028 (0.031)	0.011 (0.032)
College graduate	0.074*** (0.019)	0.057*** (0.014)	0.105*** (0.019)	0.051*** (0.019)	0.104*** (0.020)
ln(Income)	0.006 (0.013)	-0.015 (0.011)	-0.007 (0.013)	-0.028** (0.013)	-0.002 (0.013)
Currently married	0.031 (0.024)	-0.045*** (0.017)	-0.006 (0.023)	0.024 (0.023)	0.076*** (0.024)
Control for age	Yes	Yes	Yes	Yes	Yes
Rural at age 15 FE	Yes	Yes	Yes	Yes	Yes
Region and Urban FE	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes
N	3,890	3,576	3,883	3,865	3,554
Dependent variable mean	0.49	0.83	0.48	0.50	0.57

*Notes.* Effect of mother's LFP and education on gender attitudes, among men in Japan. Data are from the 2000–2008 JGSS. See Appendix A.1.3 for details. Each column refers to the following statements, respectively: (1) “If a husband has sufficient income, it is better for his wife not to have a job,” (2) “Men should cook and look after themselves,” (3) “A husband's job is to earn money; a wife's job is to look after the home and family,” (4) “A preschool child is likely to suffer if his/her mother works,” and (5) “It is more important for a wife to help her husband's career than to have one herself.” The dependent variable equals 1 if the respondent either “Disagree” or “Somewhat disagree” to the statements (except for (2), where the dependent variable equals 1 if “Agree” or “Somewhat agree”). Mother's LFP at age 15 equals 1 if mother had a paying job when respondent was about 15 years old. ln(Income) is the log of total personal income (in 1999 yen). Region is a set of six dummies, and urban is a set of three dummies for the size of municipality. Birth cohort is grouped into six decennial periods, from 1920–1929 to 1970–1983. I exclude respondents under age 25 or enrolled in school at the time of the survey. Robust standard errors in brackets. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

when he was young raises the probability that his wife works by about 6 percentage points. When the sample is restricted to college graduate men, the effect is 7.2 percentage points. This is more than a 10 percent increase since the mean of married women's LFP is about 50 percent.

Note that region, urban, and rural at age 15 dummies are included to control for regional variation; places with female-dominated industries may bias the mere chance that both mother and wife are employed. Wife's LFP is negatively correlated with husband's education, income, and the total number of children in the household. It is positively correlated with herself being college graduate. Using wife's usual hours worked per week instead of her LFP as the dependent variable yields similar results.<sup>41</sup>

Altogether, these results suggest that a mother's work experience and educational attainment affect her son's gender attitudes and marriage. Consistent with the model's assumption on intergenerational transmission, men who had working and college graduate mothers are more likely to have egalitarian gender attitudes. The probability that a man ever marries and that he has a working wife also increases with his mother's LFP and education.

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<sup>41</sup> The coefficient on mother's LFP is 3.4 hours per week for all men and 4.1 hours per week when the sample is restricted to college graduate men. They are both statistically significant at the 1 percent level.

Table 1.2: Effects of Mother's LFP and Education, Men in Japan

	Dependent variable=1 if ever married Men Over Age 35		Dependent variable=1 if wife works Married Men	
	All (1)	College graduate (2)	All (3)	College graduate (4)
Mother's LFP at age 15	0.010 (0.011)	0.033* (0.018)	0.060*** (0.019)	0.072** (0.030)
Mother college graduate	0.038 (0.035)	0.029 (0.041)	0.070 (0.063)	0.064 (0.069)
Father college graduate	0.018 (0.019)	0.024 (0.023)	-0.073** (0.032)	-0.038 (0.037)
College graduate	-0.008 (0.012)	0.000 (0.000)	-0.081*** (0.021)	0.000 (0.000)
ln(Income)	0.073*** (0.008)	0.090*** (0.015)	-0.024* (0.013)	-0.084*** (0.024)
Wife college graduate			0.071** (0.029)	0.055* (0.032)
No. of children under 19			-0.025** (0.010)	-0.039** (0.016)
Control for age	Yes	Yes	Yes	Yes
Rural at age 15 FE	Yes	Yes	Yes	Yes
Region and Urban FE	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes
N	3,767	1,252	3,798	1,302
Dependent variable mean	0.91	0.91	0.56	0.49

*Notes.* Effect of mother's LFP and education on probability ever married and wives' LFP, among men in Japan. Data are from the 2000–2008 JGSS. See Appendix A.1.3 for details. Mother's LFP at age 15 equals 1 if mother had a paying job when respondent was about 15 years old. ln(Income) is the log of total personal income (in 1999 yen). Controls for respondent's and wife's (cols. 3-4 only) are included. Region is a set of six dummies, and urban is a set of three dummies for the size of municipality. Birth cohort is grouped into six decennial periods, from 1920–1929 to 1970–1983. I exclude respondents under age 25 or enrolled in school at the time of the survey. Robust standard errors in brackets. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

### *1.4.2 Time Use of Married Asians in the U.S.*

We have just seen that Asian men are tradition-bound but are less so when their mothers are more educated and work outside the home. The supply of modern men in Asia is therefore limited. What happens when educated Asian women live in areas with more modern men? In this section, I explore time use of married Asians in the U.S. to see whether a husband's type—as proxied by his country of origin and U.S. nativity—affect his and his wife's time spent on household chores.

#### *Data*

I use the 2003–2011 waves of the American Time Use Survey (ATUS) to explore the time spent by respondents (and their household members) on both market and non-market activities. Using information on father's birthplace, I restrict my sample to respondents from the Gold Miss countries—Hong Kong, Japan, Korea, Taiwan, and Singapore.

For all analyses in this section, only married couples with spouse present are considered since couples who are currently separated or divorced do not face the same constraints in determining time allocation as couples living together. Couples with either respondent or spouse under age 25 are excluded. In comparing across generations, I distinguish between foreign born and second generation.<sup>42</sup> Appendix Table A.2 contains the summary statistics of my sample.

#### *Results*

There are several ways to group non-market activities. I have chosen to use “core non-market work” in Guryan, Hurst, and Kearney (2008), which includes activities such as food

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<sup>42</sup> All foreign born immigrants are categorized as foreign born regardless of their age at migration. There are no respondents who are foreign born yet with a U.S. born father in the sample, reducing the possibility of bias from adoptees. I also do not exclude those who have migrated to the U.S. as adults because unlike education and marriage decisions in Section 1.4.3 below, time use at home within married couples is an everyday practice, and thus is not contingent on the decisions made before coming to the U.S. Second generation is U.S. born respondents whose fathers are foreign born.

preparation, indoor cleaning, and washing/drying clothes. Time spent on shopping, and other home production such as home maintenance, outdoor cleaning, vehicle repair, gardening, and pet care are excluded, as well as time spent on child care, medical care, education, and restaurant meals. Throughout, I refer to “core non-market work” as housework.<sup>43</sup>

According to the model, U.S. born Asian men are more likely to be modern type than foreign born Asian men because they have been exposed to U.S. gender norms and families from childhood. I estimate the following equation to investigate the effect of cultural background on men’s housework hours:

$$Y_{ist} = \beta_0 + \beta_1 X_{ist} + \beta_2 U.S.born_{ist} + \gamma_t + \delta_s + \varepsilon_{ist} \quad (1.12)$$

where the  $X_{ist}$  are demographic controls such as age, education, usual work hours, the number of children in household, and the age of the youngest child in household.  $\gamma_t$  and  $\delta_s$  are year and state fixed effects, respectively.<sup>44</sup> The variable  $U.S.born_{ist}$  equals 1 if the respondent is U.S. born and 0 if foreign born. Standard errors are clustered by father’s birthplace.

Table 1.3 presents the estimates from the OLS regression. Despite the small sample size, the coefficient on U.S. born is large and highly significant. Relative to foreign born, Asian American men spend about four hours more on housework when the couple’s demographics and working hours are considered (cols. 1 and 2) and 2.5 hours more when the number and age of children are considered as well (col. 3).<sup>45</sup>

Thus, U.S. born husbands spend more time on housework than traditional foreign born husbands, taking into account couple’s demographics, working hours, and children. However,

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<sup>43</sup> All findings are robust to using a broader definition that includes other home production activities, such as “total non-market work” in Guryan, Hurst, and Kearney (2008).

<sup>44</sup> Usual work hours are only available for individuals who are employed. I recode the variable to zero for those currently unemployed. Individuals who responded “hours vary” are excluded from the analyses. Race has 21 categories and includes multiple-race in addition to all major single race classifications.

<sup>45</sup> Hwang (2013b) obtains similar results for men from countries with low female labor force participation (FLFP) rates in general. Unsurprisingly, the U.S. born effect is not statistically significant when the sample is restricted to men from countries with FLFP rates as high as that of the U.S.

Table 1.3: Assimilation of Housework Time, Men from Gold Miss Countries

Dependent variable: Man's housework time (hours per week)			
	(1)	(2)	(3)
U.S. born	4.022*** (0.706)	4.246*** (1.204)	2.471** (1.154)
Age	-0.220*** (0.077)	-0.300*** (0.062)	-0.194* (0.104)
College graduate	-4.094*** (1.147)	-4.560** (1.772)	-3.221*** (1.225)
Wife's age	0.373*** (0.071)	0.392*** (0.062)	0.320** (0.135)
Wife college graduate	1.946** (0.887)	2.057** (0.877)	2.712** (1.322)
ln(Family income)	0.913* (0.497)	0.330 (0.435)	0.493 (0.383)
Usual work hours		-0.019 (0.013)	-0.007 (0.009)
Wife's usual work hours		0.071*** (0.017)	0.079*** (0.013)
No. of children under 18			-0.258 (0.497)
Age of youngest child in household			-0.106** (0.045)
State and Year FE	Yes	Yes	Yes
N	131	116	80
Dependent variable mean	3.14	3.30	1.93

*Notes.* Effect of being U.S. born on housework hours, among married men whose father's birthplace is Hong Kong, Japan, Korea, Singapore, or Taiwan. Data are from the 2003–2011 ATUS. See Appendix A.1.4 for details. ln(Family income) is the log of family income (in 1999 dollars). I exclude respondents under age 25 or enrolled in school at the time of the survey. Standard errors are clustered by father's birthplace. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

given that men earn higher wages than women in most families, the important distinction between modern and traditional type males may not be in their own housework hours but in how much they want the housework to be done by their wives. The model predicts that a woman married to a traditional husband does more housework than a woman married to a modern one, *ceteris paribus*.

Therefore, I investigate the effect of husband’s cultural background on wife’s housework hours, where I use female labor force participation (FLFP) rates in father’s birthplace to divide countries into traditional and less traditional groups.<sup>46</sup> The United Nations (UN) provides data (from the International Labor Organization) on women’s share of labor force in 187 countries starting from 1985. To focus on adult women’s LFP and to obtain statistics for as many countries as possible, I use the FLFP rate of the 25–34 age group. I also use the oldest data available, 1985, to better reflect the gender norms that immigrants were exposed to before migrating to the U.S.

I define high (low) FLFP countries as *countries where women’s LFP rates in 1985 were higher (lower) than that of the U.S.—70.9 percent*. U.S. is used as the standard since the shift in gender norms that immigrants experience derives from the contrast between their country of origin and the U.S. A total of 121 countries in the UN data are matched to father’s birthplace in the ATUS sample, of which 42 countries are high FLFP and 79 are low FLFP. (See Appendix Figure A.1 for a map of the countries by category.) The Gold Miss countries all belong to the low FLFP category.

The regression is similar to equation (1.12) but with husband’s background as the key covariates, and standard errors clustered by husband’s father’s birthplace. Table 1.4 contains the estimation results. The size of the coefficients are large: husband’s country of origin and U.S. nativity have marginal effects of more than five hours per week when considered

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<sup>46</sup> I can alternatively use mother’s birthplace and the results are similar (95 percent of respondents have parents born in the same country). FLFP is commonly used in the political economy literature as an indicator of a country’s family culture and women’s economic status. See for example, Alesina and Giuliano (2010) and Fernández and Fogli (2009). For my purposes, married women’s LFP rates would be ideal, but they are not available in cross-country datasets.



Table 1.4: Effect of Husband's Country of Origin and U.S. Nativity on Housework Time, Women from Gold Miss Countries

Dependent variable: Woman's housework time (hours per week)			
	(1)	(2)	(3)
Husband low FLFP origin	5.983** (2.446)		4.260* (2.544)
Husband U.S. born		-5.430** (2.145)	-3.625 (2.833)
U.S. born	-1.611 (2.661)	-2.994 (2.856)	-1.110 (2.543)
Usual work hours	-0.146*** (0.051)	-0.095*** (0.032)	-0.146*** (0.051)
Husband's usual work hours	0.215*** (0.073)	0.119 (0.086)	0.202*** (0.067)
ln(Family income)	-4.736*** (1.596)	-3.777** (1.779)	-4.849*** (1.545)
No. of children under 18	3.854*** (1.459)	2.817** (1.413)	3.651** (1.407)
Age of youngest child in household	0.381 (0.278)	-0.301 (0.279)	0.230 (0.388)
Control for age, educ	Yes	Yes	Yes
State and Year FE	Yes	Yes	Yes
N	95	106	95
Dependent variable mean	16.88	16.51	16.88

*Notes.* Effect of husband's country of origin and U.S. nativity on housework time, among married women whose father's birthplace is Hong Kong, Japan, Korea, Singapore, or Taiwan. Data are from 2003–2011 ATUS. See Appendix A.1.4 for details. ln(Family income) is the log of family income (in 1999 dollars). Controls for both respondent's and husband's age and whether college graduate are included. I exclude respondents under age 25 or enrolled in school at the time of the survey. Standard errors are clustered by husband's father's birthplace. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

separately (cols. 1 and 2). When both are included as covariates in col. 3, the average housework time of Asian women married to men from high FLFP countries is about four hours less than those married to men from low FLFP countries. The magnitude translates into more than a 25 percent drop in married women's housework time.<sup>47</sup>

These results are consistent with the prediction that variation in housework hours of married women can be partly attributed to husbands' cultural backgrounds. The type of

<sup>47</sup> I obtain similar results when I use the actual FLFP rate in the husband's father's birthplace instead of the dichotomous distinction of high and low FLFP origins.

men matters not so much because men do the housework but because they do not mind their wives' doing less and outsourcing more.

Furthermore, the findings above imply that cross-country differences in the substitutability between household production and market goods cannot be the main determinant of the Gold Miss phenomenon. As mentioned in Section 1.2, not only are the relative prices of outsourcing housework in the U.S. and East Asia similar, but as shown here, there is a wide cultural variation in household time allocations even among those living in the same country.

### *1.4.3 Marriage Patterns of Koreans and Japanese in the U.S.*

My research and others suggest that immigrants are culturally similar to those in their home countries and U.S. born men are less traditional than Asian born men.<sup>48</sup> Thus, immigration from the Gold Miss countries to the U.S. can demonstrate how the marriage market equilibrium would change when more modern males become available in Asia. I use the U.S. census data to examine whether the Gold Miss phenomenon similarly exists among Koreans and Japanese in the U.S., and if not, whom the women are marrying in the U.S.

### *Data*

I use the 1980, 1990, 2000 Census and the 2001 to 2010 American Community Survey (ACS) IPUMS files.<sup>49</sup> A respondent is defined as Korean or Japanese if categorized as "Korean" or "Japanese" in the single race variable.<sup>50</sup> (Hong Kong, Taiwan, or Singapore is not recognized as single race categories. They are grouped as "Other Asian" or "Chinese.")

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<sup>48</sup> See footnote 8 for references on U.S. immigrants' cultural and economic assimilation.

<sup>49</sup> The Census and the ACS are the only datasets that have sufficiently large sample size to study the Koreans and Japanese in the U.S.

<sup>50</sup> The Census and ACS collect parent's birthplace only for respondents who live with their parents at the time of the survey (less than 5 percent of the adult population). Single race is assigned according to respondent's self-reported race in the survey and is comparable across all years and is available for all respondents (including those with multiple-race). Individuals with multiple-race are assigned to the single race category deemed most likely. However, multiple-race is extremely rare among Koreans and Japanese: 99 percent of Koreans and 98 percent of Japanese self-reported themselves as "Korean" or "Japanese" in the detailed race question (and not "Korean and White" or "Japanese and White," for instance).

Individuals younger than 25 or still attending school are excluded.

I distinguish between first and higher generations of immigrants. Because immigrants may have chosen to come to the U.S. after completing their final education in their home countries or getting married, bringing their spouses with them, I only use respondents who immigrated to the U.S. when they were younger than 18 years old. I also exclude respondents who migrated before three years old to limit the bias from including Korean and Japanese adoptees.<sup>51</sup> Foreign born in this section refers to *immigrants who came to the U.S. between ages 3 and 17*. Second and higher generations are grouped as U.S. born.<sup>52</sup>

Appendix Table A.3 reports the descriptive statistics of my sample. Foreign born are comprised of fewer Japanese because the wave of immigration from Korea has been more recent. Hence, I control for respondent's ethnicity in all my analyses.

### Results

The percentage of four-year college graduates among Korean and Japanese women increased from less than 20 percent in the 1930s birth cohort to more than 60 percent in the 1980s birth cohort. Although there were more male college graduates in the early cohorts, the increase was more gradual for men, resulting in a switch in the educational gender gap.<sup>53</sup>

Hence, the Gold Miss phenomenon among Koreans and Japanese who immigrated to the U.S. may well be more severe because the sex ratio among college graduates in the U.S. is less

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<sup>51</sup> See Appendix A.1.5 for how age at migration is calculated. Adoptees may be identified as Korean or Japanese in the Census despite having been brought up by American parents and not having any cultural connections to Korea or Japan. According to the Intercountry Adoption statistics from the U.S. Department of State, 99 percent of adoptees from Korea and Japan in 1999–2011 arrived in the U.S. when they were younger than three years old. The Holt International Children's Services data in Sacerdote (2007) also shows similar figures for Korean adoptees placed during 1964–1985: 91.4 percent of children arrived under the age of three.

<sup>52</sup> It is impossible to distinguish between these generations without information on parent's birthplace. Since the immigration wave from East Asia began in the 1960s (after the Immigration and Nationality Act Amendments of 1965), however, third or higher generations are expected to comprise a small fraction of my sample. Naturalized citizens are categorized as foreign born.

<sup>53</sup> The overall development across time is similar for the foreign born and the U.S. born. The fraction college graduate is larger among Koreans and Japanese in the U.S. than among white Americans (less than 40 percent).

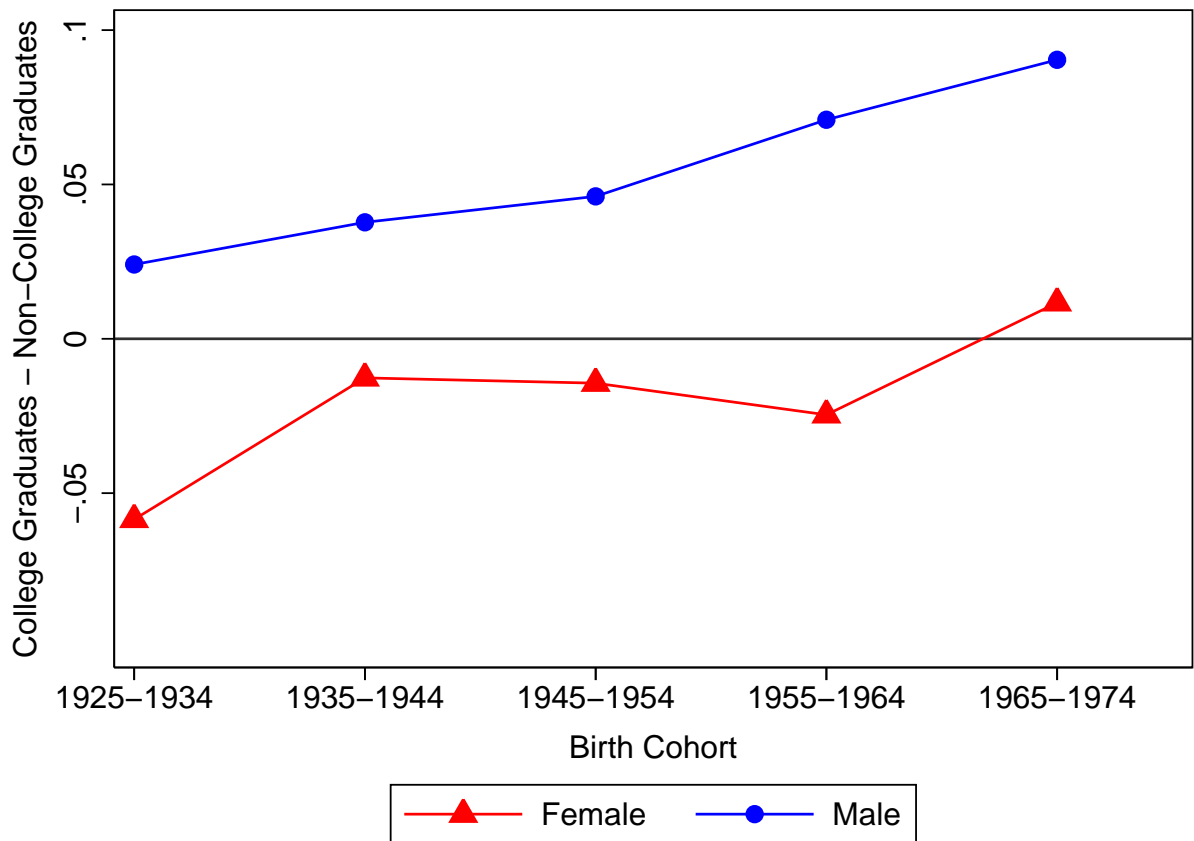


Figure 1.4: Difference in Fraction Ever Married Between College Graduates and Non-College Graduates, Koreans and Japanese Over Age 35 in the U.S.

*Notes.* Difference in the fraction ever married between college graduates and non-college graduates, among Koreans and Japanese in the U.S. over age 35 in each birth cohort. Data are from the 1980, 1990, 2000 Census and 2001–2010 ACS. I exclude respondents who have migrated to the U.S. under age 3 or over 17, or still attending school at the time of the survey.

in favor of women than in Korea and Japan, where there are more male than female college graduates. However, Figure 1.4 shows that college graduate Koreans and Japanese are as likely to be married as the non-college graduates. For both sexes, the fraction married among college graduates relative to non-college graduates has been increasing across cohorts, and the difference switched from negative to positive for women. This contrasts starkly with the downward trend found in Asia and is instead similar to the trend observed among Americans overall (see Figure 1.3). That is, the Gold Miss phenomenon does not hold in the U.S.

Because women’s educational attainment, labor force participation, and wages increased

decades earlier in the U.S. than in Asia, men who grew up in the U.S. have less traditional gender attitudes than those who grew up in Korea or Japan. College graduate women would then have greater options in the U.S. marriage market than in Korea or Japan.

This notion appears to have much validity. Among the college graduate and foreign born Koreans and Japanese, women are much more likely than men to have a spouse who is neither Korean nor Japanese (Table 1.5 Panels A and B, row 1). The gender gap is large: one third of these women married U.S. born who are not Korean or Japanese while only 16 percent of men did, and about half of the women married foreign born Korean or Japanese while more than 70 percent of men did.

The gender gap in spouse's ethnicity is smaller among the U.S. born Koreans and Japanese (Panels A and B, row 2). The incidence of having a foreign born Korean or Japanese spouse falls to 6 percent for women and 12.5 percent for men. The vast majority of both sexes marry U.S. born—89 percent of women and 81 percent of men—although men tend to marry Korean or Japanese Americans while women tend to marry Americans who do not identify themselves as Korean or Japanese (mostly white Americans).<sup>54</sup>

These findings suggest that Korean and Japanese men and women have different preferences for their spouse's ethnicity and U.S. nativity. Korean and Japanese men (particularly the foreign born) usually marry Korean or Japanese immigrants whereas Korean and Japanese women (even those who are foreign born) marry Americans.

To test whether women's inclination to marry out of their ethnic group can be explained by the Korean and Japanese men being more traditional than American men, I exploit regional variation in the composition of the Korean and Japanese male population. That is, for each state-cohort cell (six decennial birth cohorts and 51 states, including the District of Columbia), I calculate the fraction foreign born among Korean and Japanese men—number of foreign born Korean and Japanese men divided by the total number of Korean

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<sup>54</sup> The differential marriage pattern by respondent's sex and U.S. nativity are robust to including respondent's age, education, ethnicity, and state and cohort fixed effects.

Table 1.5: Spouse's Ethnicity and U.S. Nativity, College Graduate Koreans and Japanese in the U.S.

<i>Panel A: Husband is:</i>					
	KrJp Foreign born	KrJp U.S. born	Not KrJp Foreign born	Not KrJp U.S. born	Total
<i>Woman is:</i>					
Foreign born KrJp	0.526	0.063	0.067	0.344	1.000
U.S. born KrJp	0.058	0.409	0.044	0.488	1.000
Total	0.187	0.314	0.051	0.449	1.000
<i>Panel B: Wife is:</i>					
	KrJp Foreign born	KrJp U.S. born	Not KrJp Foreign born	Not KrJp U.S. born	Total
<i>Man is:</i>					
Foreign born KrJp	0.722	0.068	0.052	0.159	1.000
U.S. born KrJp	0.125	0.452	0.068	0.355	1.000
Total	0.287	0.348	0.063	0.302	1.000

*Notes.* Fraction of spouses in each ethnicity and nativity group, among college graduate and married Koreans and Japanese (KrJp) in the U.S. Data are from the 1980, 1990, 2000 Census and 2001–2010 ACS. Foreign born spouse refers to non-U.S. born regardless of spouse's age at migration. Foreign born respondent only includes those who migrated to the U.S. between ages 3–17. I exclude respondents under age 25 or still attending school at the time of the survey.

and Japanese men. A larger share means that there are more foreign born than U.S. born among the Korean and Japanese men in respondent's state-cohort.<sup>55</sup>

The estimating equation is the following linear probability model:

$$Y_{ist} = \beta_0 + \beta_1 X_{ist} + \beta_2 \text{fracfb}_{st} + \beta_3 \text{total}_{st} + \gamma_t + \delta_s + \varepsilon_{ist} \quad (1.13)$$

where the dependent variable is an indicator variable that equals 1 if husband is not Korean or Japanese and 0 otherwise. The key covariates  $\text{fracfb}_{st}$  and  $\text{total}_{st}$  are, respectively, the fraction foreign born among Koreans and Japanese men and the total number of Koreans and Japanese men in the respondent's state  $s$  and cohort  $t$ .<sup>56</sup> The usual demographic controls

<sup>55</sup> Pooling all state-cohort cells, the fraction foreign born among Korean and Japanese men ranges from 0 to 1 and has mean of 0.51 and standard deviation of 0.29. Hawaii and Idaho have low fraction foreign born whereas New Jersey and New York have high fraction foreign born among Korean and Japanese men.

<sup>56</sup> State here refers to the state of current residence. Note that state of birth cannot be used because of the foreign born group.

are included. Cohort fixed effects absorb common time trends that may exist with regards to immigration from Asia or discrimination against interracial marriage. State fixed effects control for differences across states such as the type of industries and racial composition. Standard errors are clustered at the state-cohort level.

Table 1.6 presents the result of estimating equation (1.13) separately by education and U.S. nativity of Korean and Japanese women. The positive coefficient on fraction foreign born among Korean and Japanese men shows that the probability a Korean or Japanese woman marries out of her ethnic group increases when there are fewer U.S. born among the Korean and Japanese men in her state-cohort. Moreover, consistent with the model’s assumption that the disutility from having a traditional husband is greater for educated women than for uneducated women, the coefficient is larger in magnitude for college women (cols. 1 and 2) than for non-college women (cols. 3 and 4).

The results are not driven by differences in the chance of meeting a Korean or Japanese of the opposite sex or the competition between Koreans and Japanese of the same sex in the marriage market; I control for both the total number of Korean and Japanese men and women in the respondent’s state and cohort and also the fraction foreign born within the female population. The findings imply a causal relationship between a Korean or Japanese woman’s decision to marry outside her ethnic group and the composition of men in her own ethnic group.<sup>57</sup>

One potential concern with the interpretation that Korean and Japanese women marry American men because they are modern is that American men might marry Korean and Japanese women expecting them to be obedient housewives. Another is that Korean and Japanese women might marry American men to “marry-up” in socioeconomic status. However, I find that Korean and Japanese women’s probability of working after marriage is

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<sup>57</sup> Repeating the analysis for Korean and Japanese men shows that the fraction foreign born among the Korean and Japanese women in respondent’s state and cohort does not have a statistically significant effect. That is, Korean and Japanese men’s preference for Asian wives do not respond sensitively to the composition of the female population.

Table 1.6: Effect of Korean and Japanese Male Composition on Husband's Ethnicity, Korean and Japanese Women in the U.S.

	Dependent variable=1 if husband is not Korean or Japanese			
	College graduate KrJp women		Non-college graduate KrJp women	
	Foreign born (1)	U.S. born (2)	Foreign born (3)	U.S. born (4)
Fraction foreign born, KrJp men	0.742*** (0.222)	0.573*** (0.127)	0.150 (0.252)	0.528*** (0.121)
ln(Total number of KrJp men)	-0.259* (0.135)	0.007 (0.067)	0.003 (0.068)	-0.106** (0.052)
Fraction foreign born, KrJp women	-0.119 (0.276)	0.261 (0.191)	-0.021 (0.377)	0.281 (0.174)
ln(Total number of KrJp women)	0.010 (0.140)	0.031 (0.084)	-0.276** (0.108)	0.156** (0.075)
Husband college graduate	-0.037 (0.036)	-0.035** (0.017)	0.024 (0.028)	-0.049*** (0.018)
Control for age, ethnicity	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes
N	2,965	10,817	2,414	14,108
Dependent variable mean	0.41	0.53	0.46	0.41

*Notes.* Effect of fraction foreign born among Korean and Japanese (KrJp) men in one's state and cohort on husband's ethnicity, among married Korean and Japanese women in the U.S. Data are from the 1980, 1990, 2000 Census and 2001–2010 ACS. Fraction foreign born among men (women) is the number of foreign born (regardless of age at migration) divided by the number of Korean and Japanese men (women) by state and cohort. State-cohort cells with no Korean or Japanese men (women) are excluded. ln(Total number of KrJp) is the log of the total number of Korean and Japanese men (women) by state and cohort. Controls for both respondent's and husband's age are included. Birth cohort is grouped into six decennial periods, from 1925–1934 to 1975–1985. I exclude respondents who have migrated to the U.S. under age 3 or over 17, who are under age 25, or still attending school at the time of the survey. Standard errors are clustered by state and cohort. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



higher when the husband is not Korean or Japanese (see Appendix Table A.4).<sup>58</sup> Moreover, non-Asian husbands do not have higher educational attainment than their wives relative to Asian husbands (see Appendix Table A.5).<sup>59</sup>

In summary, female Korean and Japanese college graduates in the U.S. are as likely to be married as are non-college graduates. In terms of spouse's type, Korean and Japanese women in the U.S. are much more likely to marry Americans than their male peers, particularly when the fraction of first generation immigrants is large within the Korean and Japanese male population. Korean and Japanese women's LFP after marriage and their education levels relative to their husbands' suggest that the observed marriage patterns are not driven by the selection of American men who want housewives or the marrying-up of Asian women.

## 1.5 Conclusion

The "East Asian tigers" transformed into developed economies in less than 50 years. Today, women's educational attainment and labor market performance in this region have become comparable to, or even surpassed those of other developed countries. In contrast to the U.S., however, marriage rates of college graduate women in Asia have become lower relative to that of non-college graduate women. The low marriage rates of college educated Asian women has been termed the "Gold Miss" phenomenon.

I argue that the Gold Miss phenomenon arises in traditional societies that underwent rapid growth in women's wages. Rapid improvement in women's economic status creates a gap between the women's role that men grew up observing and the role that the new generation of educated women choose to take. I test my hypothesis using data from Japan and the U.S. In Japan, I find that a mother's working status and educational attainment are positively correlated with her son's gender attitudes and his likelihood of having a working

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<sup>58</sup> Using alternative definitions of work status, such as usual hours worked per week, yields similar results.

<sup>59</sup> Using the National Latino and Asian American Survey, Chen and Takeuchi (2011) similarly find that Asian women in the U.S. who marry non-Asians are not marrying-up in terms of education or occupation status.

wife. In the U.S. time use data, I find that husbands from countries with low female labor force participation rates, like the Gold Miss countries, increase wives' housework burden. Finally, women from Korea and Japan—two major Gold Miss countries—have greater options in the U.S. marriage market because they can marry American men instead of Korean and Japanese men. Indeed, in the U.S., Korean and Japanese college women are as likely to be married as non-college women.

Overall, this paper provides an explanation for why the Gold Miss phenomenon arose in developed Asian countries and also identifies the driving forces behind the evolution of educated women's economic and household role.

## 2. The Design of Reforms with Time-Inconsistent Voters<sup>1</sup>

### 2.1 *Introduction*

It has been widely known for over a decade that the social security system not only in the U.S. but in many countries must change in order to assure sustainability. Similarly, there is widespread knowledge about environmental problems, but only small, gradual steps have been taken to solve them. In this paper, we theoretically investigate why efficiency-enhancing political reforms are often delayed, and why when a reform does begin, it is often implemented gradually even though it would be more efficient to carry it out at once.

The source of delay and gradualism that we propose is that voters are time-inconsistent, i.e., they value utility in the present disproportionately higher than the same utility at any period in the future.<sup>2</sup> We investigate the consequences of such time-inconsistency of the voters when policies have costs and benefits that accrue over time, and the decision that agents have to make is when to start a reform and how to spread out these costs and benefits.

We first present a benchmark model in which a patient agenda-setting politician is exogenously given. Then using a citizen candidate framework, we explore the case in which the agenda setter is endogenously determined by voters. The model shows that gradualism may be welfare-enhancing relative to big bang even though it cannot exploit complementarities in reform packages. That is, gradualism is inefficient compared to the first-best situation where the reform is carried out at once at the optimal point in time. However, welfare may be higher than when gradualism is not an alternative, because otherwise the reform would

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<sup>1</sup> This is joint work with Johanna Mollerstrom.

<sup>2</sup> See Phelps and Pollak (1968) and Laibson (1997).

have been undertaken at an even later point, or not at all. We also find that sophisticated agents would elect an agenda setter who is more patient than the median voter in order to commit to gradualism (and avoid procrastination).

This paper is closely related to the literature that began to flourish when the Soviet bloc collapsed and a large number of formerly planned economies faced the question about whether, and how, to transition to a market economy. Most of the earlier papers were specifically aimed at studying this particular transition.<sup>3</sup>

Two camps emerged in the debate on gradualism versus big bang. Proponents of the big bang approach emphasize the complementarity of reform packages (Lipton and Sachs, 1990; Murphy, Shleifer, and Vishny, 1992). On the other hand, gradualism is shown to arise in equilibrium when there is substantial heterogeneity in the payoffs people receive from the reform (Wei, 1993) or when there is uncertainty about the outcome of the reform (Dewatripont and Roland, 1992). In these cases, gradualism may help build political alliances in support of the reform or provide information about whether or not a reform is worth implementing at all.

Relatedly, there are papers that focus on the question of delay rather than gradualism. Here, political concerns are often a key ingredient in models: incumbents want to avoid initiating costly reforms during their terms in order to get re-elected. Reforms are even more difficult to carry out when interest groups or firms providing campaign funds lobby against them (Brock and Magee, 1978; Grossman and Helpman, 1994). Alesina and Drazen (1991) discuss how stabilization can be delayed as a result of a war of attrition between different socioeconomic groups.

However, some policies do not necessarily fall into the contexts mentioned above and yet gradualism is still contemplated as a political alternative. In order to understand why this is so, we present a model where both delay and gradualism may arise even in the absence of heterogeneity in payoffs, uncertainty, and political concerns for re-election.

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<sup>3</sup> See Roland (2000) for an overview of the literature.

Our paper contributes to the existing literature in several ways. First, it is one of the first attempts to apply the findings in behavioral economics to political economy, by introducing present-biased preferences into a model of political reform.<sup>4</sup> Second, our model is more generally applicable than the models that are structured around the specific historic example of transitional economies. In fact, our model can have implications for any policies with an inter-temporal nature. Third, the results of this paper allow us to differentiate between reforms that can benefit from gradualism and those that cannot. Hence, it provides normative guidelines as well as a positive analysis of the gradualist approach.

Lastly, this paper is, to our knowledge, the first paper to explicitly incorporate the election of an agenda setter into the reform model. In previous work, a benevolent social planner or a reform-minded government is given and the focus is on how to schedule the reforms thereafter. This has been a common assumption in the literature but a major caveat when it comes to understanding how reforms are actually designed, because the objective of the policy maker is critical in determining the equilibrium strategy.

The outline of the paper is as follows. In Section 2.2, we present the benchmark model with an exogenously given patient agenda setter. In Section 2.3, we endogenize the agenda setter using a citizen candidate framework. Section 2.4 discusses potential applications of our model. Section 2.5 concludes.

## 2.2 *Benchmark Model with Exogenous Agenda Setter*

### 2.2.1 *Setup*

Our model is populated by agents who have present-biased preferences: a bias for the present over the future. We adopt the hyperbolic discounting framework to capture this bias (Laibson, 1997). When  $u_t$  is a person's instantaneous utility in period  $t$  and  $U^t(u_t, u_{t+1}, \dots, u_T)$

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<sup>4</sup> Bisin, Lizzeri, and Yariv (2011) is, to our knowledge, the only other paper which explores the consequences of time-inconsistent voters in relation to political reform. Their paper, however, is not about assessing gradualism and big bang but about explaining the consumption-savings problem.

is a person's intertemporal preferences from the perspective of period  $t$ , hyperbolic discounting can be represented by:

$$U^t(u_t, u_{t+1}, \dots, u_T) = \delta^t u_t + \beta \sum_{\tau=t+1}^T \delta_\tau u_\tau \quad (2.1)$$

for all  $t$ .

The exponential, time-consistent discount factor is denoted as  $0 < \delta \leq 1$  while the hyperbolic discount factor, representing the bias for the present, is denoted as  $0 < \beta \leq 1$ . Note that if  $\beta = 1$ , equation (2.1) collapses to standard exponential discounting. In our model, agents are heterogeneous in their  $\beta$  such that some are more “patient” (have  $\beta$  closer to 1) than others. Let  $0 < \beta^M < 1$  be the median voter's  $\beta$ .

At each time period, agents must decide whether to start the reform or not, and whether to perform the reform as a big bang or gradually. Consider the simple case of having three time periods,  $t = 1, 2, 3$ . Following the notations in O'Donoghue and Rabin (1999), let  $c = (c_1, c_2)$  be the *cost schedule* and  $v = (v_1, v_2)$  be the *benefit schedule*. If the society agrees to implement the reform as a *big bang* in period  $t$ , agents receive  $v_t$  but incurs cost  $c_t$ . If the reform is not carried out until  $t = 2$ , it must be implemented then. That is, the status quo is unsustainable and a reform will be impossible to avoid sooner or later. Hence, there are two big bang options: at  $t = 1$  (BB1) and at  $t = 2$  (BB2).<sup>5</sup>

*Gradualism* is defined as a reform that is implemented across  $t = 1, 2$  by shifting a fraction ( $0 < \alpha < 1$ ) of the cost (or benefit) to a later (or earlier) time period. For example, agents borrow against future benefits or receive subsidies for undertaking the change. Unlike papers that imposes a more restrictive definition of gradualism, we allow the fraction  $\alpha$  to be endogenously determined within the model.<sup>6</sup> That is, gradualism need not take the form

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<sup>5</sup> Because we will be discussing reforms where benefits come a period later than the costs, BB3 is not an option.

<sup>6</sup> For example, in Wei (1993), gradualism is defined as removing tariffs in two steps: lifting tariffs on good  $x$  and then on good  $y$ . In Dewatripont and Roland (1995), gradualism is about trying “reform 1” for one period and then deciding whether to try “reform 2” as well.

of an equal split across time periods. We denote gradualism with a shifting parameter of  $\alpha$  as  $\text{GR}(\alpha)$ .

However, the flexibility of gradualism comes at a cost. Compared to big bang, it is inherently inefficient because complementarities between different parts of the reform package cannot be exploited and extra administrative work or potential distortions may arise from manipulating the payoff stream.<sup>7</sup> Let  $x$  represent the loss from gradualism. For example, if a fraction of the cost,  $\alpha c_1$ , is shifted from  $t = 1$  to  $t = 2$ , an extra cost of  $x\alpha c_1$  is incurred in addition to  $c_1$ .

*Social welfare* is defined as the utility of an agent with  $\beta = 1$  at a hypothetical  $t = 0$ . That is, we stay close to the welfare definition of O'Donoghue and Rabin (1999) which is centered around what an agent, if fully informed, would like to do when planning her future actions. Our welfare definition is also related to the psychological distinction of a “hot” and “cold” state of mind, where the “hot” state is the decisions made under the influence of short-term emotions whereas the “cold” state is the planning stage where long-term decisions are made without influence of short-term emotions. Social welfare is then defined by the more rational decisions made in the “cold” state (Loewenstein, 2000).

Given this setup, the society must agree on a reform schedule. The agenda setter (AS) proposes the alternatives to put to vote, and the reform schedule that wins under majority ruling is implemented. In this section, we assume that an agenda setter with time-consistent preferences ( $\beta^{AS} = 1$ ) is exogenously given. As a result, the agenda setter is comparable to a benevolent social planner in that maximizing her utility would coincide with maximizing social welfare. Note that she is not a dictator, however, as she cannot impose a reform schedule on the people.

Below we solve the benchmark model for reforms with immediate costs. At the end of

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<sup>7</sup> Complementarity of reform packages is a common reason for supporting the big bang approach. See for example, Murphy, Shleifer, and Vishny (1992) and Lipton and Sachs (1990). Those who favor gradualism also acknowledge the efficiency cost tied to partial reforms. See for example, Dewatripont and Roland (1995) and Wei (1993).

the section, we also briefly discuss the implications of the model for reforms with immediate benefits and reforms with no time lags in costs and benefits.<sup>8</sup> For simplicity, we assume  $\delta = 1$  throughout to focus on the intertemporal trade-offs that arise from present-biasedness.<sup>9</sup>

### 2.2.2 Reforms with Immediate Costs

Reforms with immediate costs refer to those with costs that are incurred today whereas benefits are realized later in time. Most policies, in fact, fall into this category as they are some sort of investments for the future. For example, the rewards of environmental policies can only be enjoyed periods after the actual costs of the reform are incurred by the population. Procrastination is costly, however, since the environment would only become more polluted if no action is taken. (See Section 2.4 for further discussion.)

The benefit from the reform is constant whether the reform is implemented in period 1 or 2 ( $v_1 = v_2 = v$ ), whereas the cost increases with time ( $c_1 < c_2$ ). As in (2.1), the intertemporal utility from the reform for an agent living in period  $t = 1$  can thus be expressed as:

$$\begin{cases} U^1(BB1) = -c_1 + \beta v \\ U^1(GR) = -(1 - \alpha)c_1 - x\alpha c_1 + \beta(v - \alpha c_1) \\ U^1(BB2) = \beta(-c_2 + v) \end{cases} \quad (2.2)$$

The benefit is realized at  $t = 2$ , and hence is always discounted by  $\beta$ . When the reform is done gradually, only  $(1 - \alpha)$  of the costs are incurred today and the rest,  $\alpha c_1$ , is shifted to tomorrow.<sup>10</sup> As discussed above, gradualism accompanies a loss in efficiency proportionate to the distortion imposed,  $x\alpha c_1$ .

The agenda setter's problem is to maximize her own utility from the reform (which is equal to social welfare) knowing that what she puts to vote must satisfy majority ruling.

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<sup>8</sup> The terms “immediate costs” and “immediate benefits” are introduced in O’Donoghue and Rabin (1999).

<sup>9</sup> All results can be generalized to  $\delta < 1$ . The earlier version of this paper solves the model with  $\delta < 1$ .

<sup>10</sup> Defining gradualism like this, or as the fraction of benefits moving closer in time yields identical results.



Clearly, if she was not subject to any political constraints, she would choose BB1. With costs increasing with time, the first-best is to carry out the reform as soon as possible.

However, the agenda setter in our model must take into account the preferences of the population. We concentrate on the case where  $\beta^M c_2 < c_1 < c_2$ : costs increase over time but the increment is not so large as to make the median voter prefer BB1 to further delay.<sup>11</sup> Then the agenda setter cannot propose BB1 because she knows it would be rejected by the majority of the voters.<sup>12</sup> They would rather have the default schedule of BB2.

Would the agenda setter propose gradualism instead? She will do so only if the following two conditions hold: first, gradualism provides higher social welfare than BB2 and second, gradualism can win majority vote over BB2. If the first condition is not met, the agenda setter does not have any incentive to suggest gradualism since it is the worst option. If the second condition is not met, even if she proposes, she will not be able to implement it.

Plugging in  $\beta^{AS} = 1$  to equation (2.2) we get the agenda setter's  $U^1$ , which equals social welfare (SW) from each reform schedule:

$$\begin{cases} SW(BB1) = -c_1 + v \\ SW(GR) = -c_1 - x\alpha c_1 + v \\ SW(BB2) = -c_2 + v \end{cases} \quad (2.3)$$

Hence the first condition, the incentive compatibility condition (*IC*) for the agenda setter to propose gradualism is satisfied when  $SW(GR) \geq SW(BB2)$ :

$$\alpha x c_1 \leq c_2 - c_1 \quad (IC)$$

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<sup>11</sup> If  $c_1 < \beta^M c_2$ , the median voter prefers BB1 to BB2, just like the patient agenda setter. The society implements the most efficient schedule, BB1, and the model ends here.

<sup>12</sup> Since the problem is single peaked in  $\beta$  we know that the median voter theorem is applicable.

or equivalently,

$$\alpha \leq \frac{c_2 - c_1}{xc_1} (= \hat{\alpha}) \quad (2.4)$$

The agenda setter has no incentive to propose gradualism with  $\alpha$  larger than  $\hat{\alpha}$ , because in that case, the default option of BB2 gives higher social welfare.

From (2.2), we can also solve for the second condition  $U^1(GR) \geq U^1(BB2)$ . The political constraint ( $PC$ ) for gradualism is:

$$\alpha(1 - \beta^M - x)c_1 \geq c_1 - \beta^M c_2 \quad (PC)$$

where  $\beta^M$  denotes the median voter's  $\beta$ . When  $0 < x < 1 - \beta^M$ , ( $PC$ ) can be rewritten as:

$$\alpha \geq \frac{c_1 - \beta^M c_2}{(1 - \beta^M - x)c_1} (= \alpha^*) \quad (2.5)$$

That is, a majority of the voters would prefer GR to BB2 at  $t = 1$  if gradualism allows for an  $\alpha$  larger than  $\alpha^*$ .

Combining these observations we get the following proposition.<sup>13</sup>

**Proposition 1.** *The reform schedule that a patient agenda setter proposes depends on the size of  $x$ . When  $x \geq 1 - \beta^M$ , ( $PC$ ) cannot be satisfied for any  $0 < \alpha < 1$ , and hence the agenda setter cannot propose GR. When  $1 - \frac{c_1}{c_2} < x < 1 - \beta^M$ , the range of  $\alpha$  that satisfies ( $PC$ ) does not satisfy ( $IC$ ), and hence the agenda setter does not propose GR. When  $0 < x \leq 1 - \frac{c_1}{c_2}$ , the agenda setter proposes GR with  $\alpha = \alpha^*$  where  $\alpha^*$  is defined as in (2.5).*

In words, when the inefficiency tied to gradualism,  $x$ , is too large, gradualism cannot serve as an alternative to BB2. The loss of efficiency exceeds the cost of procrastination. When  $x$  is in the intermediate range, the median voter prefers GR to BB2 as long as the reform schedule allows for an  $\alpha$  that is larger than  $\alpha^*$ . However, from the agenda setter's point of view, a distortion of  $\alpha^*$  is not worth undertaking given the non-trivial size of  $x$ .

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<sup>13</sup> The proof is in the Appendix.

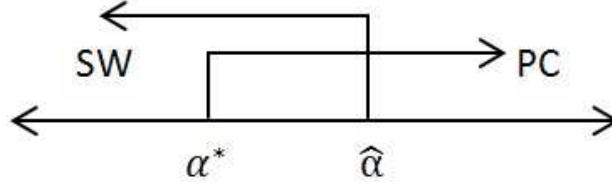


Figure 2.1: Conditions for  $GR(\alpha^*)$

When  $x$  is small enough, however, both the median voter and the agenda setter agrees that  $GR$  is superior to  $BB2$ . That is, there exists an  $\alpha$  that satisfies both  $(IC)$  and  $(PC)$  (see Figure 2.1). Because social welfare is decreasing in  $\alpha$ , the agenda setter proposes the smallest  $\alpha$  that satisfies  $(PC)$ , i.e.  $\alpha^*$ .

Consider the following example:  $\beta^M = 0.5$ ,  $v = 15$ ,  $c_1 = 6$ ,  $c_2 = 10$ ,  $x = 0.3$

Plugging in these numbers to (2.2), the median voter's utility from the reform is:  $U^1(BB1) = 1.5$ ,  $U^1(GR) = 1.5 + 1.2\alpha$ , and  $U^1(BB2) = 2.5$ . From (2.3), we know that the patient agenda setter's valuation is:  $SW(BB1) = 9$ ,  $SW(GR) = 9 - 1.8\alpha$ , and  $SW(BB2) = 5$ . Social welfare is highest when the reform is implemented as  $BB1$ , but the median voter prefers to procrastinate. The agenda setter can then propose gradualism with  $\alpha = \frac{5}{6}$  to make the median voter indifferent between  $BB2$  and  $GR$ . Notice that with  $\alpha = \frac{5}{6}$ , although social welfare is not as high as that from  $BB1$ , it is still higher than that from  $BB2$ . This  $\frac{5}{6}$  is the  $\alpha^*$  in  $(PC)$ . Indeed, this example falls into the category in Proposition 1 where  $0 < x < 1 - \frac{c_1}{c_2}$ .

The example helps us understand the following proposition.

**Proposition 2.** *Gradualism is inefficient compared to the first-best choice under time-consistency ( $BB1$ ) but welfare-enhancing compared to the default choice under time-inconsistency ( $BB2$ ).*

Furthermore, it is important that the agenda setter is the one who chooses which  $\alpha$  to propose. If the agents are left to themselves and have the option of gradualism, they would prefer  $GR$  with  $\alpha \approx 1$  to both  $BB1$  and  $BB2$  as well as to  $GR(\alpha^*)$ , because  $U^1(GR)$  is increasing in  $\alpha$ . From the perspective of social welfare,  $GR(\alpha \approx 1)$  is clearly inferior to

$GR(\alpha^*)$ .<sup>14</sup>

**Proposition 3.** *Gradualism results in lower welfare without the existence of an agenda setter who is more patient than the median voter.*

### 2.2.3 Reforms with Other Time Structures

Although most cases of political reforms have the investment character discussed above, i.e. have costs that precede benefits, there are also policies that have different structure in terms of the timing of costs and benefits. Two such cases are (i) reforms with immediate benefits, and (ii) reforms without any time lags in costs and benefits.

First, consider reforms of the “immediate benefit” type, i.e. with benefits preceding costs. There is no room for gradualism in this setting:

**Proposition 4.** *Gradualism never arises in equilibrium for immediate benefit reforms; gradualism is neither politically feasible nor efficient.*

To see why, let the model remain the same as above, except that now the benefits from the reform are  $v = (v_1, v_2)$  with  $v_1 < v_2$  whereas the costs are constant  $c = (c, c)$ . Hence, “waiting” yields higher welfare but time-inconsistent agents are tempted to take action “too soon.” If we interpret gradualism analogously as above, it means moving a fraction  $\alpha$  of the benefits further away in time, with an additional loss of  $x\alpha v_1$ .

The question is whether voters would ever prefer GR to BB1. Unlike in the case of immediate cost reforms, GR here would never be attractive to the median voter because it involves decreasing the benefits today. The extra distortion involved with shifting makes gradualism even less desirable.

A patient agenda setter, however, may still want to propose GR instead of BB1. The reason is that this could make waiting till  $t = 2$  (which the agenda setter may want to

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<sup>14</sup> We have assumed  $\delta = 1$  here but with  $\delta < 1$ ,  $GR(\alpha \approx 1)$  yields even lower social welfare than BB2. That is, the choice of gradualism with  $\alpha \approx 1$  can make the society worse off than with procrastination.

do because  $v_1 < v_2$ ) a relatively more attractive option for the median voter. However, gradualism will never be the equilibrium. Unlike in the immediate cost case where gradualism is inefficient yet welfare-enhancing, in the immediate reward case, it is only inefficient. The default option of BB2 is always superior to GR, and if left by themselves, people will choose BB1, so there is no reason for GR to become the final outcome. Gradualism can only play the role of deterrence.

Second, we can also imagine reforms where the costs and the benefits are realized at the same time. The payoff from implementing a reform at  $t$  is then simply  $-c_t + v_t$ . The following proposition holds in this setting:

**Proposition 5.** *Gradualism never arises in equilibrium when reforms do not have time lags between costs and benefits; gradualism may be politically feasible but it is not efficient.*

If BB1 is preferred to BB2 at  $t = 0$  (i.e. BB1 has higher social welfare), agents would do so at  $t = 1$  as well, and hence the agenda setter has no incentive to propose a schedule other than BB1. On the other hand, if BB2 is better than BB1 at  $t = 0$ , there is a possibility that the median voter's preference switches at  $t = 1$ .<sup>15</sup> The agenda setter, however, allows BB1 to happen. Although an impatient median voter may find gradualism to be an alternative to BB1 (as long as  $x$  is not too large), the agenda setter finds gradualism to be inefficient. There exists no  $\alpha$  that would satisfy her (IC).

In sum, Propositions 4 and 5, when compared to Proposition 2, implies that not all political reforms benefit from gradualism. Depending on the time structure of the costs and benefits it may be the case that gradualism will never be a part of the equilibrium.

**Proposition 6.** *Reforms of the “immediate cost” type can benefit from gradualism, whereas reforms where the benefits precede the costs, or where there is no time lag between costs and benefits cannot.*

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<sup>15</sup> This happens when  $\beta^M(-c_1 + v_1) < \beta^M(-c_2 + v_2) < -c_1 + v_1$ .

Thus if gradualism is observed in these latter cases, it cannot be justified with agents being present-biased.

## 2.3 *Endogenizing the Agenda Setter*

### 2.3.1 *Setup*

In the previous section, we assumed that the agenda setter is exogenously given and has  $\beta^{AS} = 1$ . We now relax this assumption and consider a citizen candidate framework. Any agent can run for office (declare to be a candidate), and when elected she chooses a policy that maximizes her own utility.<sup>16</sup>

Therefore, we add a voting stage  $t = 0$  to the benchmark model. At this period, people vote on a candidate with a specific  $\beta$ . The candidate who receives the most votes is elected as the agenda setter. Thereafter, the model proceeds as before. At  $t = 1$ , the elected agenda setter proposes a reform schedule and the citizens vote on the proposal. The proposal that wins majority support is implemented. If the reform has not started by  $t = 2$ , it is implemented as BB2 by default.

Now that agents vote for the agenda setter at  $t = 0$  and the reform at  $t = 1$ , we have to be more explicit about what agents believe about their future preferences.<sup>17</sup> The behavioral economics literature discusses two possibilities: agents are either *sophisticated* or *naive*. Sophisticates are aware of their present-biasedness and know that they will have the same self-control problem in the future. Naifs, on the other hand, have present-biased preferences but (incorrectly) believe that they are time-consistent.

We concentrate on the case where agents are sophisticated, both because it is more

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<sup>16</sup> Standard models in political economy assume that candidates commit to implement any policy promise. While legitimate in models where candidates have no policy preferences, one has to otherwise explain why winning candidates keep their promises (Alesina, 1988; Besley and Coate, 1997).

<sup>17</sup> This did not matter in the benchmark model because the agenda setter was exogenously given regardless of the agents' awareness of their own  $\beta$ .

realistic and because it is more interesting to study.<sup>18</sup> If the society is composed of naifs only, the agenda setter's  $\beta$  would not matter in the citizens' voting decision because they (incorrectly) anticipate BB1 to be proposed by any candidate. The agenda setter would just be a random draw from the candidates, and hence policy outcomes would be unpredictable.

For simplicity, we also assume that the cost of running for office and the rents from being in office are trivial. By doing so, we avoid having to make additional assumptions regarding the relative size of the cost and benefit of being an agenda setter that are unrelated to that from the reform itself.

### 2.3.2 The Citizen Candidate Model

We solve the model by backward induction starting from  $t = 2$ . In this period, the only available option is BB2. At  $t = 1$ , the available options are BB1, GR and BB2. Note that the median voter's problem at this time period is equivalent to that of the benchmark model. His preferences are as in equation (2.2) with  $\beta = \beta^M$ , so he would choose to delay implementing the reform.

The agenda setter's problem, however, is different from the previous section.  $\beta^{AS}$  may not equal to one, and hence her utility can no longer be defined as social welfare. The agenda setter's utility at  $t = 1$  are:

$$\begin{cases} U_{AS}^1(BB1) = -c_1 + \beta^{AS}v \\ U_{AS}^1(GR) = -(1 - \alpha)c_1 - x\alpha c_1 + \beta^{AS}(v - \alpha c_1) \\ U_{AS}^1(BB2) = \beta^{AS}(-c_2 + v) \end{cases} \quad (2.6)$$

and the incentive compatibility condition ( $IC'$ ) for the agenda setter to propose gradualism

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<sup>18</sup> Most economists assume sophistication because it implies that people have rational expectations about future behavior (O'Donoghue and Rabin, 1999). The use of various commitment devices to solve self-control problems is one example that suggests people are aware of their time-inconsistency.

Table 2.1: Policy Preferences by Agenda Setter's  $\beta^{AS}$

Cases	(IC')	Agenda Setter's Preference
(a) $\beta^{AS} > 1 - x$ and $\beta^{AS} \geq \frac{c_1}{c_2}$	holds for $\alpha \leq \frac{c_1 - \beta^{AS} c_2}{(1 - \beta^{AS} - x)c_1}$	GR, min $\alpha$
(b) $1 - x \leq \beta^{AS} < \frac{c_1}{c_2}$	does not hold for any $\alpha > 0$	BB2
(c) $\frac{c_1}{c_2} < \beta^{AS} \leq 1 - x$	holds for all $\alpha > 0$	GR, max $\alpha$
(d) $\beta^{AS} < 1 - x$ and $\beta^{AS} \leq \frac{c_1}{c_2}$	holds for $\alpha \geq \frac{c_1 - \beta^{AS} c_2}{(1 - \beta^{AS} - x)c_1}$	GR, max $\alpha$

is now:

$$\alpha(1 - \beta^{AS} - x)c_1 \geq c_1 - \beta^{AS}c_2 \quad (IC')$$

Thus the agenda setter's choice depends not only on the relative size of  $x$ ,  $c_1$ , and  $c_2$  (as in (IC)), but also on her own  $\beta^{AS}$ . In Table 2.1, we summarize the agenda setter's preferred choice for each possible range of  $\beta^{AS}$ .

An agenda setter with a large  $\beta^{AS}$  (patient; case (a)), has strict standards for gradualism. Even when implementing it, her incentive is to minimize distortions. In contrast, an agenda setter with a small  $\beta^{AS}$  (impatient; case (d)), would be willing to exploit the flexibility of gradualism with the largest  $\alpha$  possible. The intermediate cases (b) and (c) depend on the relative size of  $x$  with regards to  $\frac{c_1}{c_2}$ . In any of these cases, the agenda setter's preferred choice may not lead to an actual proposal, however, because there is also the political constraint to take into consideration.

Knowing the preferences in Table 2.1, agents vote on an agenda setter at  $t = 0$ . Agents rationally expect what policy a candidate with a certain  $\beta$  would propose once elected. In order to vote for the one who will maximize their utility (as of  $t = 0$ ), the citizens must determine which reform schedule would be the most efficient.

Hence, agents compare  $U^0(GR)$  and  $U^0(BB2)$ . There is no need to consider  $U^0(BB1)$  because sophisticates know that BB1 will never be proposed by any agenda setter at  $t = 1$



due to the political constraint.

$$\begin{cases} U^0(GR) = \beta(-c_1 - x\alpha c_1 + v) \\ U^0(BB2) = \beta(-c_2 + v) \end{cases}$$

Thus, GR yields higher welfare than BB2 when the following inequality holds:

$$\alpha \leq \frac{c_2 - c_1}{xc_1} (= \hat{\alpha}) \quad (2.7)$$

That is, if there is an agenda setter who would propose an  $\alpha$  that is smaller than  $\hat{\alpha}$ , and if that proposal could satisfy  $(PC)$  at  $t = 1$ , agents would vote for such a candidate. Otherwise, gradualism fails to be a feasible option.

Which reform design would be at the intersection of the median voter's and the agenda setter's interests? From Proposition 1, we know that when  $x \geq 1 - \beta^M$ ,  $(PC)$  cannot be satisfied for any  $0 < \alpha < 1$ . No agenda setter would be able to propose gradualism at  $t = 1$  that survives majority ruling. BB2 would be the final outcome regardless of the agenda setter's preferences.

When  $1 - \frac{c_1}{c_2} < x < 1 - \beta^M$ , the range of  $\alpha$  that satisfies  $(PC)$  does not satisfy inequality (2.7). That is,  $\alpha^* > \hat{\alpha}$ . Thus agents do not want to elect a candidate who will propose  $GR(\alpha)$  that meets the political constraint, because gradualism is inferior to BB2 in this range of  $x$ . So they elect an agenda setter who will *not* have any incentive to propose gradualism: a candidate with  $1 - x < \beta^{AS} < \frac{c_1}{c_2}$  (Table 2.1 case (b)).

Lastly, when  $0 < x \leq 1 - \frac{c_1}{c_2}$ , there exists an  $\alpha$  such that satisfies both (2.7) and  $(PC)$ . That is,  $\alpha^* < \hat{\alpha}$ . Thus for  $\alpha \in [\alpha^*, \hat{\alpha}]$ , the median voter prefers GR to BB2 at  $t = 0$  and at  $t = 1$ . Hence, agents elect an agenda setter who would propose gradualism with an  $\alpha$  in this range, which is Table 2.1 case (a). The agenda setter proposes the smallest  $\alpha$  that satisfies her  $(IC')$ , and so  $GR(\alpha^*)$  is implemented.

Therefore, gradualism only arises in equilibrium when  $x$  is small, as in the benchmark

model. Because case (a) has  $\beta^{AS} > \frac{c_1}{c_2}$ , we know that  $\beta^{AS} > \beta^M$  automatically holds. We have hence proved the following proposition:

**Proposition 7.** *The elected agenda setter is more patient than the median voter but is not necessarily an agent with  $\beta = 1$ .*

The elected agenda setter proposes gradualism with the smallest efficiency cost possible given the political constraint. Sophisticated agents are able to avoid the worst outcome of procrastination by delegating the agenda setting authority to an agent who is more patient than the median voter. We can also see that the benchmark model studied in the previous section is a special case of this general model because  $\beta^{AS} = 1$  is one example of candidates that belong to Table 2.1 case (a).

Let us consider the example in Section 2.2 again. The parameters are such that  $0 < x \leq 1 - \frac{c_1}{c_2}$ . Plugging in the numbers to (2.5) and (2.7), we get  $\alpha^* = \frac{5}{6}$  and  $\hat{\alpha} = \frac{20}{9}$ . That is, at  $t = 0$ , agents prefer GR to BB2 when  $\alpha \leq \frac{20}{9}$  (i.e. any  $0 < \alpha < 1$ ) and at  $t = 1$ , agents prefer GR to BB2 when  $\alpha \geq \frac{5}{6}$ . Among the politically feasible GR options, social welfare is highest when  $\alpha = \frac{5}{6}$ . A candidate with  $\beta > 0.7$  has the incentive to propose that reform schedule, and so is elected to be the agenda setter.

Again, we see how agents avoid inferior gradual schedules by electing an agenda setter who is more patient than the median voter (Proposition 3). This results in a reform schedule more efficient than BB2, which is what would have been implemented without the gradualism option (Proposition 2).

## 2.4 Potential Applications of our Framework

In this section, we apply our model to policy areas with immediate costs and delayed benefits.

**European fiscal crisis** One example of a political problem that has so far only been temporarily solved by gradual measures is the European sovereign debt crisis. This crisis has

made it difficult for some countries in the euro area to repay or re-finance their government debt without the assistance of third parties.

That this problem was present was clear already at the beginning of the 2000s, when several EU member states were failing to stay within the confines of the Maastricht treaty (which limits fiscal spending and debt limits). That a solution had to be reached was widely recognized, even though the exact form of solution was debated.

Attempts to solve the problem was however not made until almost ten years later, when in 2009 the costs of the failing of the system became too large to handle as a result of the financial crisis affecting government debt levels around the world. At that point various solutions were contemplated. On the one hand, there were large scale solutions being suggested that would cost more upfront but would work not only for currently affected countries but also for those potentially being affected in the future. On the other hand, there were solutions which provided gradual solutions, in the sense of putting out the fire in currently affected countries only.

In the end, the latter path was chosen, and gradual solutions have since then been provided for a number of countries, including Greece, Ireland, Portugal, Cyprus and several others. Even though the calculations are hard to make, it is not unreasonable to believe that this solution, compared to a larger, one-time solution, has been much more costly, especially if taking into account the continuous negative impact on financial markets.

***Environmental problems*** Environmental problems were recognized globally already in 1972, when the United Nations Conference on the Human Environment agreed upon common principles concerning the environment and development. Although countries at different stages of development had conflicting interests, there was an increasing consensus that something must be done to prevent further destruction.

Finally in the mid-1980s, two international treaties were signed to protect the ozone layer: the 1985 Vienna Convention and the 1987 Montreal Protocol. These treaties oblige developed countries to reduce the production of pollutants responsible for ozone depletion

to half their 1986 levels by 1999 and developing nations to limit their future consumption of such substances.

The protocols dictates phasing-out the production of numerous substances believed to be responsible for ozone depletion. That is, the reform has a gradual design. It would be more efficient to reach target levels at once but such big bang approach would not gain majority support (satisfy the political constraint). It would thus be welfare-enhancing to at least start the reform by committing to a gradual schedule.

Congleton (1992) presents empirical evidence that authoritarian governments are less likely to participate in environmental regulations compared to democratic regimes. Although we do not explore different political institutions in this paper, our model provides one potential explanation for these findings. In democratic regimes, where any agent can run for office as modelled in Section 2.3, the elected agenda setter would be more patient than the median voter of the population. However, in authoritarian regimes, there is no reason for the representative to be any more patient than the median voter, in which case, he would opt for delay.

## 2.5 *Conclusion*

Reforms that everyone knows are inevitable and which would be most efficient to implement right away are often delayed and, when they are finally carried out, are done only gradually. Why this is the case has been puzzling political economists for decades. Possible reasons for gradualism and delay studied in the literature include heterogeneity in the payoffs of the reform, uncertainty about the outcome of the reform, and political concerns such as re-election.

This paper provides a new explanation for gradualism that builds on time-inconsistency on the part of the voters. Our model is populated by agents who vary in their degree of time-inconsistency, and features an agenda setting politician who has the authority to make proposals to the voters on reform designs. The society must decide on when and how

(gradually or as a big bang) a reform should be implemented.

We find that given the choice, sophisticated agents elect an agenda setter who is more patient than the median voter. That is, election is a kind of commitment device for present-biased agents. Gradualism arises in equilibrium as a result of the trade-off between the time-inconsistency of the median voter (who wants benefits now regardless of the lost complementarities) and the time-consistency of the agenda setter (who tries to minimize the complementarities lost). Gradualism is inefficient compared to the first-best option but welfare-enhancing compared to what would have been implemented without the option of gradualism.

Moreover, by comparing various time structures of reforms, we show that gradualism cannot be an equilibrium when there is no time lag between costs and benefits or when benefits precede costs. That is, gradualism can be justified with the present-biasedness of the voters only when reforms have immediate costs.

Our model is a first step in the analysis of reform design under time-inconsistency. The model suggests that even when the awareness of the need for reform is strong and it can be argued that neither uncertainties nor heterogeneities in payoffs are crucial factors, delay and gradualism may still occur. The paper sheds light on the virtues of gradualism when agents are time-inconsistent, and thereby offers a different outlook to the existing debate on big bang versus gradualism.

### 3. The Second Shift: Housework Time Among Immigrants

#### *3.1 Introduction*

Gender equity in the workplace has greatly increased during the past decades. But gender inequity at home persists and women struggle to balance family and career. Hochschild (1989) introduced the term “second shift” to capture the reality that many working women have yet another shift after they come home from work—housework and childcare.<sup>1</sup>

The division of labor at home is dictated by various economic factors but it is also governed by gender norms. Regardless of labor market performances, women are still assumed to take the role of primary homemaker and nurturer, particularly in societies with rigid gender norms. But it is difficult to assess how important or persistent cultural factors are in determining household roles because countries differ in many aspects.

This paper studies time spent on household chores among immigrants to the U.S. by country of origin and generation since migrating. Using the 2003–2011 American Time Use Survey, I document both the existence and fade-out of cultural effects: the gender gap in housework time is larger among immigrants from countries with lower female labor force participation (FLFP) rates, but the gap reduces significantly from first to second generation. Assimilation occurs among both men and women, but the effects are mainly driven by the decrease in housework time of women from low-FLFP countries.

Furthermore, spouse’s cultural background—source country and U.S. nativity—affects housework time. Exploiting variation in spouse’s characteristics within immigrants from the

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<sup>1</sup> See Goldin (2004) for a historical discussion of the changes in U.S. college graduate women’s family and career choices.

same country, I find that both the FLFP rates in spouse's country of origin and spouse's generation since migrating to the U.S. have significant impacts on the housework time of first generation immigrants. Having a U.S. born spouse increases a man's housework time and reduces a woman's.

The findings indicate that cultural factors impact how much time the husband and wife allocate to household production even after controlling for the couple's working hours and family characteristics. That is, cultural persistence and assimilation effects on housework time are not merely the flip side of the patterns found in immigrants' labor market outcomes, but a process in its own.

The paper contributes to the literature that investigates the importance of family culture on economic outcomes (Giuliano, 2007; Fernández and Fogli, 2009; Alesina and Giuliano, 2010) and also studies on immigrants' assimilation profiles (Borjas, 1985; Blau, Kahn, and Papps, 2011). Much of the research in these areas have focused on labor market outcomes and fertility rates of European or Mexican descents. My paper shows that there is substantial assimilation in immigrants' gender roles with regards to household production, which ultimately affects married women's capability of balancing work and family.

More broadly, the findings contribute to understanding the transition married women are experiencing in their roles, and suggest how existing gender norms and spouse choice may be key factors in shaping this evolution. As discussed in Feyrer, Sacerdote, and Stern (2008), when women's status in the labor market progresses further than that in the household, the discrepancy leads to more work in general for women—they have jobs but also keep a “traditional” home. First generation female immigrants from low FLFP countries experience this double burden, particularly if they migrated with their husbands. Second generation, however, develop less traditional gender attitudes growing up in the U.S., and they also have more options in the U.S. marriage market. Women may break off from the norms in their parent's birthplace by marrying outside their ethnic group, to American men (Hwang, 2013a).

The paper is organized as follows. Section 3.2 describes the data and presents descriptive patterns of U.S. immigrants’ housework time by sex, source country, and marital status. Section 3.3 presents empirical evidence on assimilation in housework time across generations. Section 3.4 studies how spouse’s cultural background influences housework time. Section 3.5 concludes.

## *3.2 Data and Descriptive Patterns*

### *3.2.1 Data*

The 2003–2011 waves of the American Time Use Survey (ATUS) conducted by the U.S. Bureau of Labor Statistics contains information on time spent by respondents on both market and non-market activities. There are several ways to define activities that constitute the second shift, but I use “core non-market work” in Guryan, Hurst, and Kearney (2008), which includes the activities of food preparation, indoor cleaning, and washing or drying clothes.<sup>2</sup> (Child care is another major household activity, but it has both the component of household production and leisure. See Aguiar and Hurst, 2007; Guryan, Hurst, and Kearney, 2008.) Throughout, I refer to “core non-market work” as housework.

As a measure of the gender roles in immigrants’ home country, I use female labor force participation (FLFP) rates in father’s birthplace (FBPL).<sup>3</sup> FLFP is commonly used in the political economy literature as an indicator of a country’s family culture and women’s economic status.<sup>4</sup> The United Nations (UN) provides data (from the International Labor Organization) on women’s share of labor force in 187 countries starting from 1985. To focus on adult women’s labor supply and to obtain statistics for as many countries as possible, I use

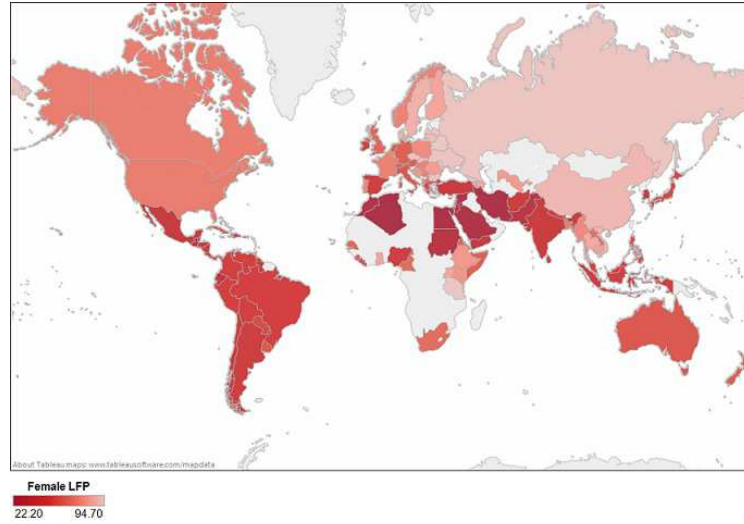
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<sup>2</sup> Time spent on shopping, and other home production such as home maintenance, outdoor cleaning, vehicle repair, gardening, and pet care are excluded, as well as time spent on medical care, education, and restaurant meals.

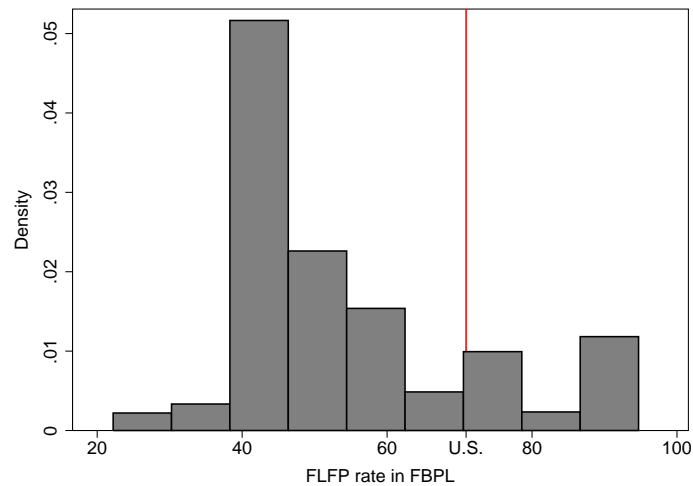
<sup>3</sup> I can alternatively use mother’s birthplace and the results are similar (95 percent of respondents have parents born in the same country).

<sup>4</sup> See for example, Fernández and Fogli, 2009; Alesina and Giuliano, 2010.





(a) Female Labor Force Participation Rates in 1985



(b) Histogram of FLFP rates, Married with Spouse Present

*Figure 3.1: Female Labor Force Participation Rates in Country of Origin*

*Notes.* Map and histogram of the FLFP rates in FBPL, matched to the ATUS sample. FLFP in FBPL is the labor force participation rates of women in age group 25–34 in 1985 in father’s birthplace. Data are from the United Nations (UN). See Appendix C.1 for details. (a) Total of 121 countries in the UN data are matched to the ATUS sample. Unmatched countries (either because they do not have data on FLFP or because they are not available as FBPL in the ATUS) are in white. (b) Histogram of the FLFP rates in FBPL, among married respondents. U.S. has FLFP rate of 70.9 percent in 1985.

the FLFP rate of the 25–34 age group. I also use the oldest data available, 1985, to better reflect the gender norms that immigrants were exposed to before migrating to the U.S.

Figure 3.1 (a) displays the countries matched to my sample and (b) plots the histogram of the FLFP rates in father’s birthplace among married respondents. The FLFP rates ranges from 22.2 percent to 94.7 percent, with the U.S. having a FLFP rate of 70.9 percent in 1985. Countries with FLFP rates higher than that of the U.S. include Canada, Nordic countries, former Communist countries, and a few African countries. Most countries in South and Central America, East and South Asia, and the Middle East have lower FLFP rates.

For most analyses in this paper, only married couples with spouse present are considered because couples who are currently separated or divorced do not face the same constraints in determining time allocation as couples living together. Respondents enrolled in school and couples with either respondent or spouse under age 25 are excluded from my sample as well.

In comparing across generations, I distinguish between first and second generation using the information on father’s birthplace. All foreign born immigrants are categorized as first generation regardless of their age at migration. Second generation are U.S. natives whose fathers are foreign born.<sup>5</sup> I do not include third or higher generations because their ancestry cannot be identified with the ATUS data. (They all have U.S. as their father’s birthplace.)

Appendix Table C.1 contains the summary statistics of the married respondents in my sample. All observations are weighted using the person weight. Second generation immigrants are on average older, more educated, have fewer children, and are from higher FLFP countries relative to first generation immigrants. More than one third of the first generation have Mexico as their father’s birthplace. I take these into account in my regressions.

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<sup>5</sup> There are no respondents who are foreign born yet with a U.S. born father in the sample, reducing the possibility of bias from adoptees. Note that some second generation may not be U.S. born, because those who are born abroad of American parents are also included in this group.

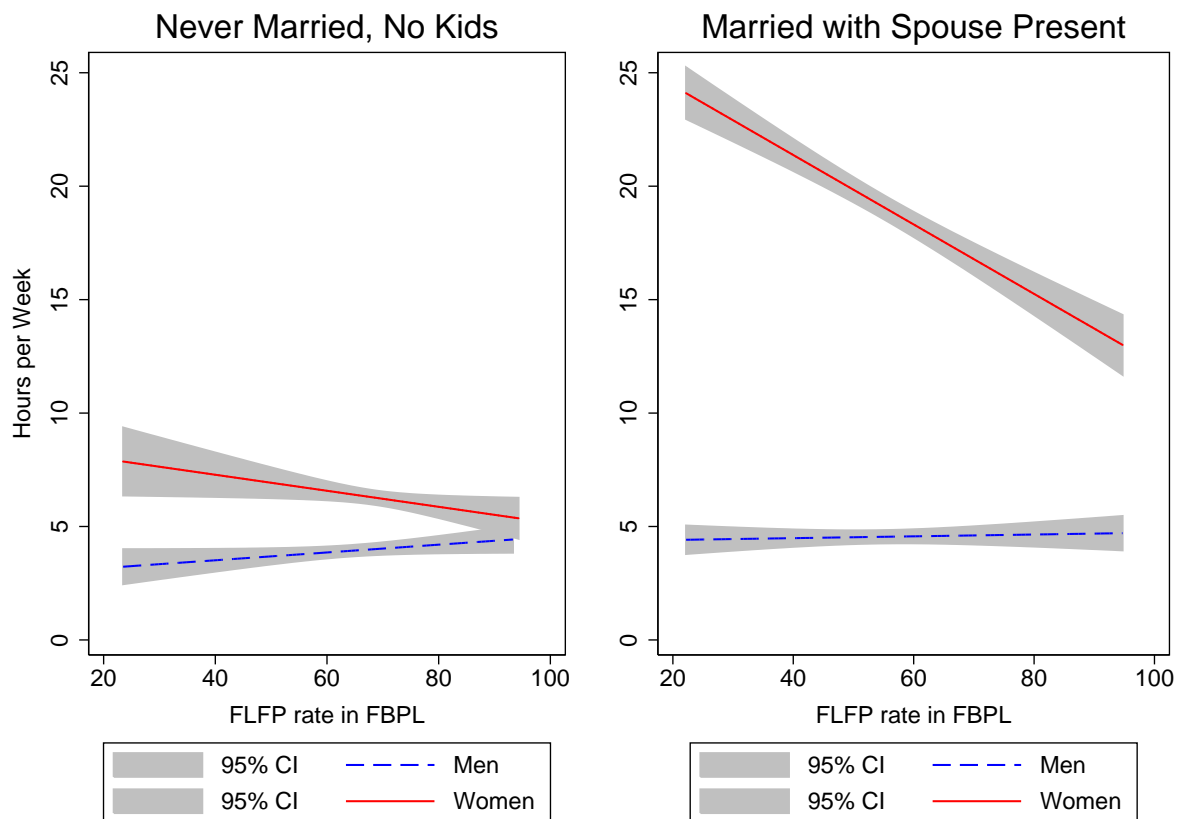


Figure 3.2: Housework Time by Country of Origin and Marital Status

*Notes.* Linear predictions (with 95 percent confidence intervals) of time spent on housework on FLFP in FBPL. Data are from the 2003–2011 ATUS. See Appendix C.1 for details. FLFP in FBPL is the labor force participation rates of women in age group 25–34 in 1985 in father’s birthplace. I exclude respondents under age 25 or enrolled in school at the time of the survey.

### 3.2.2 Descriptive Patterns

I begin by documenting the relationship between immigrants’ source country FLFP rates and their housework time in the U.S. Figure 3.2 presents the hours per week spent on housework by country of origin, sex, and marital status—never married with no kids and married with spouse present.<sup>6</sup> A number of observations can be made from this figure.

First, women spend more time on housework than men regardless of marital status or

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<sup>6</sup> I restrict the group of singles to those who do not have children in order to reduce the bias from there being more single mothers than single fathers.

source country FLFP rate. The gender gap is less than five hours per week among those who have never married and have no kids, but can be as large as twenty hours per week for those who are married and from countries with low FLFP rates.

Second, women's housework time is inversely related to the FLFP rates in father's birthplace whereas men's housework time is positively related (if not at all) to the FLFP rates in father's birthplace. Similar to the findings in the literature, immigrants' behavior mirrors the norms in their home country. But note that the variation is small among men—the difference across countries of origin is driven by women from high FLFP countries doing less housework than women from low FLFP countries.

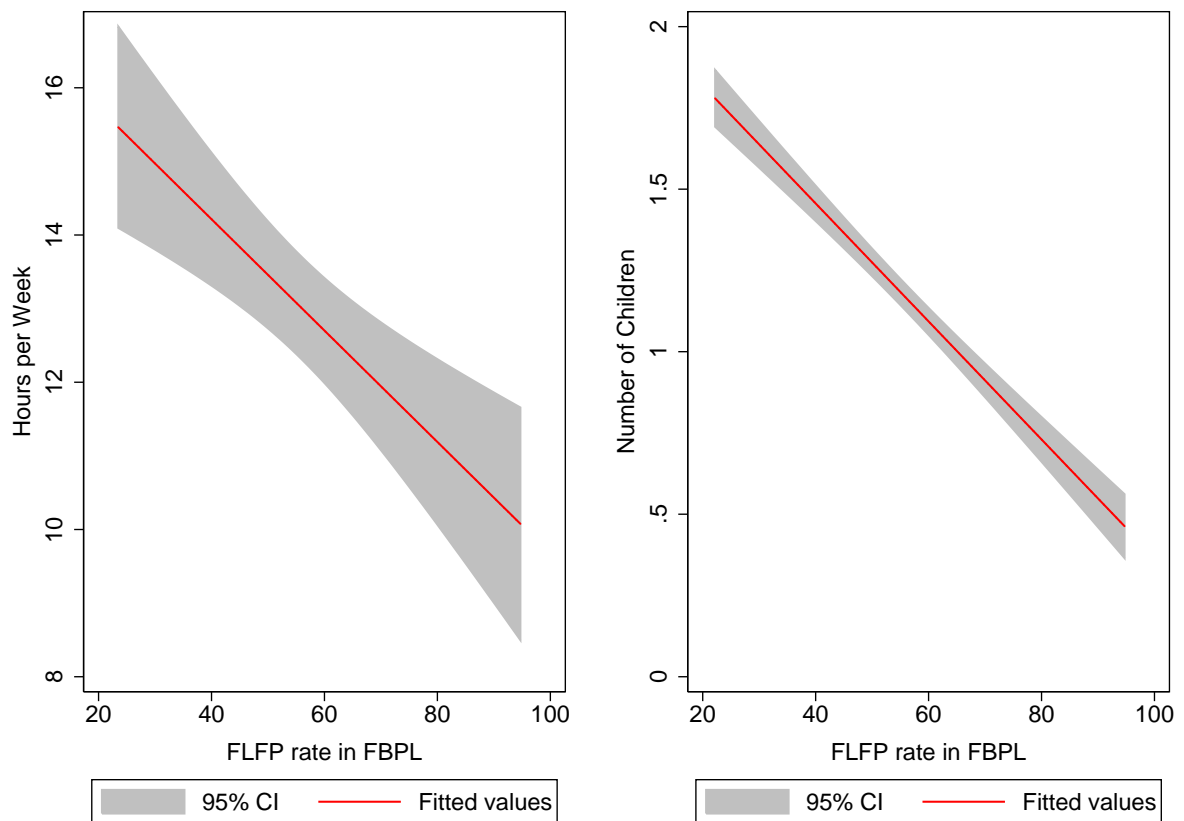
Third, both the gender gap and the variation across immigrants' countries of origin are magnified for married couples relative to singles. Although there is a few hours difference in housework time between single men and women, their slopes with regards to FLFP rates are almost flat. This finding suggests that there are no fundamental differences across cultural backgrounds in the amount of household work done by adults if not for the family roles that begin with marriage.

In short, married women from low FLFP countries seem to be the ones doing the most housework in the U.S. But are they doing more total work, or are the extra hours of housework fully compensated by their fewer hours of labor market work?

Figure 3.3 plots the housework time and number of children of full-time working and married women.<sup>7</sup> Although the variation in housework time across countries of origin is smaller than when all married women are considered (Figure 3.2), a gap of six hours per week remains between low and high FLFP source country. The average number of children is also higher among women from low FLFP countries. Thus even among married women who are employed full-time, we observe strong source country effects such that women from low FLFP countries end up with more work in general.

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<sup>7</sup> Full-time employment is defined as working 35 or more hours per week.



*Figure 3.3:* Housework Time and Number of Children by Country of Origin, Full-Time Working and Married Women

*Notes.* Linear predictions (with 95 percent confidence intervals) of time spent on housework and number of children under 18 in household on FLFP in FBPL, among full-time working and married women. Data are from the 2003–2011 ATUS. See Appendix C.1 for details. FLFP in FBPL is the labor force participation rates of women in age group 25–34 in 1985 in father’s birthplace. Full-time employment is considered to be 35 or more hours per week. I exclude respondents under age 25 or enrolled in school at the time of the survey.

### 3.3 *Assimilation in Housework Time Across Generations*

In the previous section, I demonstrated that the gender roles prevalent in one's home country, as measured by female labor force participation rates, have strong correlations with the time married immigrant couples spend on household work in the U.S. But do these effects last until the second generation? Or is there assimilation in housework time producing convergence to U.S. levels?

Figure 3.4 plots housework time of married men and women by their generation since migrating to the U.S. Again, men's housework hours are roughly constant regardless of the FLFP rates in father's birthplace. For women, the pattern is starkly different by generation. Housework time of first generation women has a strong negative relationship with FLFP rates in father's birthplace whereas that of second generation women is relatively invariant to source country. This means that the cross-FBPL variation in women's housework time observed in Figure 3.2 above is mostly due to the first generation.

In addition to the flatter slope with regards to source country FLFP rates, housework time is shorter on average among second generation women relative to first generation: the mean drops from 20.7 hours per week to 15.4.<sup>8</sup> Noting that the average time spent on household chores among married women who are third (or higher) generation, non-Hispanic, white is 14.6 hours per week, the trend suggests that immigrants' housework time *converges* to U.S. levels.

But for the difference across generations to be interpreted as *assimilation* in gender roles at home, the difference must remain after controlling for the couple's working hours. That is, if the second generation have fewer housework hours because they have longer market work hours, then the convergence in housework time cannot be separated from the assimilation in labor market participation already documented in the literature. Moreover, if it is indeed cultural assimilation (and not other factors that would affect all U.S. immigrants similarly),

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<sup>8</sup> This does not take into account the potential difference in the composition of source countries in each generation. I address this concern below.

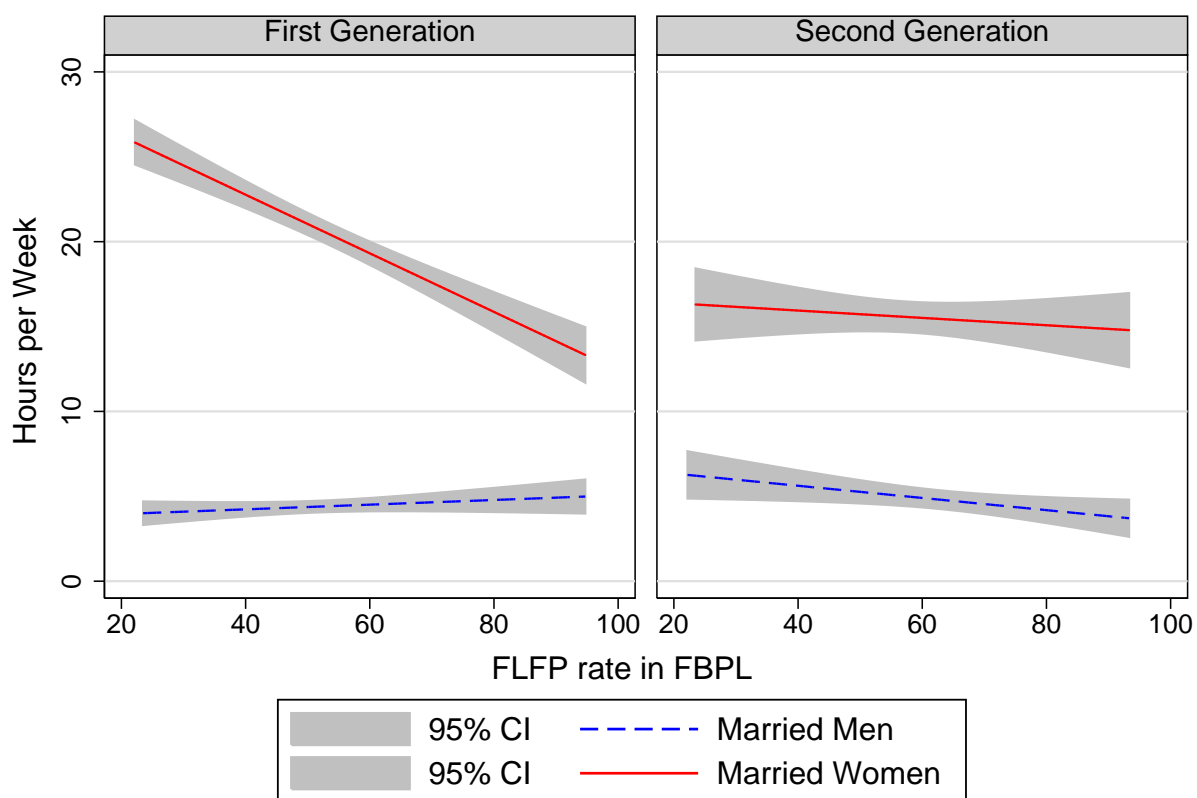


Figure 3.4: Assimilation in Housework Time, Married with Spouse Present

*Notes.* Linear predictions (with 95 percent confidence intervals) of time spent on housework on FLFP in FBPL, among married respondents. Data are from the 2003–2011 ATUS. See Appendix C.1 for details. FLFP in FBPL is the labor force participation rates of women in age group 25–34 in 1985 in father’s birthplace. I exclude respondents under age 25 or enrolled in school at the time of the survey.

there should be differential effects for immigrants by their source country. The difference in housework time between first and second generation should be larger for immigrants from countries with a larger gender norm gap with the U.S.—the more traditional countries.

Thus, I estimate the following equation to test for assimilation in housework time among immigrants:

$$Y_{ist} = \beta_0 + \beta_1 X_{ist} + \beta_2 Second_{ist} + \beta_3 FLFP_{ist} + \theta Second_{ist} * FLFP_{ist} + \gamma_t + \delta_s + \varepsilon_{ist} \quad (3.1)$$

The dependent variable equals housework time (hours per week) of individual  $i$  living at state  $s$  in year  $t$ .  $X_{ist}$  are demographic controls such as age and educational attainment of the couple.<sup>9</sup> I include year ( $\gamma_t$ ) and state ( $\delta_s$ ) fixed effects to take into account the variation that may exist in the availability of market substitutes for household production.<sup>10</sup> Dummies for the respondent's race and whether Mexican origin are also included.<sup>11</sup> Key covariates are *Second*, *FLFP*, and their interaction term. *Second* equals 1 if the respondent is second generation and 0 if first. *FLFP* is the female labor force participation rate in respondent's father's birthplace (in 100 percentage point units, i.e. percentage divided by 100). Standard errors are clustered by one's father's birthplace.

Table 3.1 reports the results, separately for the married men and women in my sample. Col. 1 controls for demographic characteristics, family income, and state and year fixed effects. Usual working hours of both the respondent and the spouse, and the number and age of children are additionally taken into account in cols. 2 and 3, respectively.<sup>12</sup> Col. 4 includes all the controls.

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<sup>9</sup> Using dummies for college graduate and high school graduate instead of years of education as covariates yields similar results.

<sup>10</sup> Low-skilled immigrants are employed in services that are close substitutes for household production, and hence the population of immigrants may affect the labor supply of educated women in that region. See Cortes and Tessada (2011).

<sup>11</sup> Race has 21 categories and includes multiple-race in addition to all major single race classifications.

<sup>12</sup> Usual work hours are only available for individuals who are employed. I recode the variable to zero for those currently unemployed. Individuals who responded "hours vary" are excluded from the analyses.



Table 3.1: Assimilation in Housework Time, Married with Spouse Present

	Dependent variable: Housework time (hours per week)							
	Men				Women			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Second generation	3.058*** (1.046)	2.004* (1.053)	3.993*** (1.415)	2.775** (1.342)	-8.635*** (1.897)	-6.613*** (1.579)	-9.290*** (1.897)	-7.431*** (1.644)
FLFP rate in FBPL	0.746 (1.476)	0.440 (1.449)	3.374* (1.745)	2.524 (1.731)	-8.128*** (2.292)	-5.445*** (2.006)	-6.971*** (2.273)	-4.294** (1.926)
Second gen*FLFP rate in FBPL	-4.883*** (1.853)	-3.836* (2.041)	-6.289** (2.715)	-4.653* (2.722)	8.775** (3.386)	5.603* (2.947)	10.104*** (3.396)	8.475** (3.271)
ln(Family income)	-0.039 (0.183)	0.215 (0.226)	-0.185 (0.221)	-0.081 (0.249)	-2.120*** (0.410)	-1.138*** (0.393)	-3.127*** (0.355)	-2.348*** (0.360)
Usual work hours		-0.077*** (0.010)		-0.081*** (0.013)		-0.244*** (0.019)		-0.243*** (0.024)
Spouse's usual work hours		0.048*** (0.011)		0.059*** (0.013)		0.062*** (0.019)		0.054** (0.021)
No. of children under 18			0.179 (0.201)	0.279 (0.188)			0.894*** (0.295)	0.640*** (0.235)
Age of youngest child in household			-0.003 (0.034)	-0.018 (0.039)			0.014 (0.077)	0.122** (0.061)
Control for age, educ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mexico FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4,683	4,192	3,035	2,725	5,240	4,842	3,525	3,306
Dependent variable mean	4.55	4.56	4.61	4.69	19.42	19.49	21.11	21.20

*Notes.* Effect of country of origin and U.S. nativity on housework time, among married respondents. Data are from the 2003-2011 ATUS. See Appendix C.1 for details. FLFP rate in FBPL is the labor force participation rate of women in age group 25-34 in father's birthplace in 1985 (in 100 percentage point units). ln(Family income) is the log of family income (in 1999 dollars). Controls for both respondent's and spouse's age and years of education are included. I exclude respondents under age 25 or enrolled in school at the time of the survey. Standard errors are clustered by father's birthplace. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

For men, in all four specifications, the coefficient on second generation is positive whereas the interaction term is negative. (The marginal effect of FLFP rate in father's birthplace is positive but insignificant, except in col. 3.) That is, second generation men spend more time on housework compared with first generation men, but the difference is smaller for those who are from high FLFP countries. The magnitude of the coefficient on *Second* decreases when the couple's working hours are included, but still remains non-trivial in size (more than two hours per week).

Cols. 5-8 repeats the exercise for married women. In all four columns, the coefficient on *Second* is large and negative, *FLFP* is negative, and the interaction term is positive. They are all statistically significant at the 1 percent level. This means that second generation women spend less time on housework compared with first generation women, but the difference is smaller for those who are from high FLFP countries. The marginal effect of FLFP rate in father's birthplace is negative, consistent with the negative slope observed in Figure 3.4.

The coefficient on *Second* does not change much in magnitude with the inclusion of covariates regarding children (compare col. 5 with 7 and 6 with 8). However, when the working hours of the couple are taken into consideration (cols. 6 and 8), the size of the coefficient on *Second* decreases by more than 2.2 hours per week—from about 9.8 hours to 7.6 hours. So some of the variation in housework time is indeed absorbed by differences in labor force participation: women from low FLFP countries work fewer hours in the labor market than women from high FLFP countries. But there still remains a large gap of more than seven hours per week across the two generations.

Note that my estimates of the effect of second generation on housework time may be attenuated due to the inclusion of child immigrants in the first generation group. Those who came to the U.S. when they were young, and hence who may well have as less traditional gender attitudes as those who were born in the U.S., are categorized as first generation. If only adult immigrants were compared with the second generation, the generational differences in

housework time would be even larger than those found here.

To address the concern that the difference between first and second generation may be confounded by shifts in the composition of countries of origin across generations, in Appendix Table C.2, I include father's birthplace fixed effects. This exercise transforms the analysis above into within-FBPL comparisons. I find that the coefficient on *Second* remains negative and statistically significant for women though smaller in magnitude. For men, the coefficient on second generation is not statistically significant in the fixed effects specification.<sup>13</sup>

In sum, I find that there is assimilation in housework time among U.S. immigrants in addition to the assimilation in their labor market participation. Controlling for the married couple's working hours and other family characteristics, there still exists a significant differences in housework time between the first and second generation: men's housework hours increase whereas women's decrease. Robustness check with father's birthplace fixed effects confirms the intergenerational assimilation among women. Differential effects across countries of origin and gender is suggestive of an impact of source country gender norms rather than unmeasured factors that could affect men and women from different countries similarly.

### 3.4 *The Spouse Effect on Housework Time*

Because housework is in large measure a public good for the household, if one spouse does more, the other may do less. Thus housework time is not only a function of the time spent on other activities but also the time one's *spouse* spends on various activities. It need not be a zero-sum game, however; the couple has the option of outsourcing, for example, eating out or hiring a domestic worker.

Given the labor market productivity of the couple and the price of market substitutes for household production, the couple's decision regarding housework—its allocation between

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<sup>13</sup> There may also be differences in spouse's cultural background associated with one's generation. I discuss the spouse effect in the next section.

Table 3.2: Spouse's Generation and Father's Birthplace

	<i>Panel A: Spouse's generation</i>			<i>Panel B: Spouse's FBPL</i>	
	First	Second	Third+	Same FBPL	Different FBPL
<i>Men:</i>					
First Generation	0.824	0.050	0.126	0.754	0.246
Second Generation	0.135	0.313	0.552	0.299	0.701
Total	0.633	0.123	0.244	0.62	0.3728
<i>Women:</i>					
First Generation	0.774	0.060	0.166	0.712	0.288
Second Generation	0.149	0.315	0.536	0.282	0.718
Total	0.602	0.130	0.268	0.593	0.407

*Notes.* Fraction of spouses in each generation and father's birthplace (FBPL) group, among married respondents. Data are from the 2003–2011 ATUS. See Appendix C.1 for details. Third generation refers to U.S. natives whose fathers were also born in the U.S. Same FBPL means the spouse has the same FBPL as the respondent. I exclude respondents under age 25 or enrolled in school at the time of the survey.

the husband and wife, and its total amount—would thus be influenced by both own and spouse's beliefs in gender roles at home.<sup>14</sup> In this section, I study the importance of spouse's cultural background in determining one's housework time.

Table 3.2 presents the fraction of my sample's spouses in each generation (Panel A) and father's birthplace (Panel B) category. As noted in previous studies, own and spouse characteristics are highly correlated. In particular, the vast majority of first generation immigrants have spouses who are first generation (nearly 80 percent) or who have the same father's birthplace (more than 70 percent). Second generation immigrants are more likely to have spouses who do not share their father's birthplace—about 70 percent have spouses with different FBPL from their own. But more than 85 percent of the second generation's spouses are U.S. born as well (either second, third, or higher generation).

The collinearity between respondent's and spouse's generation and/or country of origin makes it difficult to estimate the impact of spouse's cultural background. To investigate the spouse effect, I hence break down the sample to subgroups—by sex and generation.

<sup>14</sup> Because housework defined in this paper does not include activities such as breastfeeding, it is reasonable to assume that there need not be inherent gender differences in housework productivity. This is particularly true with the advancement and prevalence of household appliances today (Greenwood, Seshadri, and Yorukoglu, 2005).

The estimating equation is similar to (3.1) with the respondent's housework time as the dependent variable.<sup>15</sup> But now spouse's FLFP in father's birthplace and generation since migrating to the U.S. are the key covariates, and standard errors are clustered by spouse's father's birthplace. Although my sample consists of first and second generation immigrants only, they may well have third or higher generation as spouses. So I include two dummies—*Spouse U.S. born* and *Spouse third generation*. *Spouse U.S. born* equals 1 if the spouse is either second or higher generation, and *Spouse third generation* equals 1 if the spouse is third or higher generation.

FBPL fixed effects are included as well as other demographic controls, race, state, and year fixed effects. That is, I study the effect of spouse's cultural background holding constant the source country of the respondent, thereby exploiting variation in spouses' characteristics within respondents from the same country. This reduces the bias that may arise due to women from high (or low) FLFP country disproportionately marrying men from high (or low) FLFP country, or due to shifts in the composition of countries from which immigrants originate.

Table 3.3 presents the estimation results separately for first and second generation male respondents (cols. 1-4 and cols. 5-8, respectively). The specifications with regard to including working hours and children as controls are as in Table 3.1 above. For first generation men, the coefficient on FLFP rate in wife's father's birthplace is negative whereas the coefficient on wife third generation is positive.<sup>16</sup> For second generation men, wife's country of origin loses its statistical significance. Only wife's U.S. nativity continues to be positively related with man's housework time with a marginal effect of about two to three per week, depending on the specification.

Similarly, Table 3.4 presents the estimation results separately for first and second gen-

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<sup>15</sup> Although demographic characteristics of other household members are available in the ATUS, time use information is only collected from the respondent. Hence, I cannot look at the *ratio* of housework done by the respondent relative to the spouse. However, the inference may be similar because there is not much variation across households in husbands' housework time.

<sup>16</sup> Only 6 percent of first generation men have second generation spouses. See Table 3.2 Panel A.

Table 3.3: Effect of Wife's Cultural Background on Man's Housework Time

	Dependent variable: Housework time (hours per week)							
	First generation men				Second generation men			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FLFP rate in wife's FBPL	-5.586** (2.472)	-6.354*** (2.222)	-6.823** (2.970)	-7.297*** (2.581)	3.330 (2.821)	4.677 (2.897)	-0.901 (3.606)	-0.418 (3.999)
Wife U.S. born	0.621 (0.882)	0.940 (1.183)	1.091 (0.678)	0.998 (0.795)	1.824*** (0.513)	1.782*** (0.511)	3.422*** (0.973)	3.053*** (0.931)
Wife third generation	1.544* (0.927)	1.493 (1.133)	1.868** (0.884)	2.172** (0.943)	-0.903 (0.711)	-1.480** (0.721)	0.195 (0.929)	0.387 (1.113)
ln(Family income)	-0.298 (0.196)	-0.040 (0.227)	-0.539** (0.226)	-0.311 (0.336)	0.655*** (0.191)	0.890** (0.358)	0.157 (0.495)	-0.070 (0.351)
Usual work hours		-0.080*** (0.009)		-0.091*** (0.023)		-0.064*** (0.010)		-0.045*** (0.014)
Wife's usual work hours		0.051*** (0.008)		0.062*** (0.007)		0.040*** (0.012)		0.049** (0.022)
No. of children under 18			0.271* (0.156)	0.366** (0.151)			0.006 (0.232)	0.154 (0.189)
Age of youngest child in household			0.008 (0.026)	-0.006 (0.022)			-0.160** (0.070)	-0.132*** (0.035)
Control for age, educ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FBPL FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,408	3,042	2,449	2,195	1,310	1,177	617	554
Dependent variable mean	4.43	4.53	4.49	4.61	4.97	4.72	5.30	5.22

Notes. Effect of wife's country of origin and U.S. nativity on man's housework time. Data are from the 2003-2011 ATUS. FLFP rate in FBPL is the labor force participation rate of women in age group 25-34 in father's birthplace in 1985 (in 100 percentage point units). ln(Family income) is the log of family income (in 1999 dollars). Controls for both respondent's and wife's age and years of education are included. I exclude respondents under age 25 or enrolled in school at the time of the survey. Standard errors are clustered by wife's father's birthplace. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 3.4: Effect of Husband's Cultural Background on Woman's Housework Time

	Dependent variable: Housework time (hours per week)							
	First generation women				Second generation women			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FLFP rate in husband's FBPL	-8.933*** (3.235)	-6.757** (2.708)	-4.484 (3.828)	-3.197 (4.036)	-1.756 (4.245)	-0.749 (4.858)	-5.317 (5.469)	-3.407 (5.489)
Husband U.S. born	0.276 (1.584)	0.339 (1.465)	0.724 (1.341)	0.845 (1.022)	2.345** (1.145)	2.359** (1.180)	1.047 (1.346)	0.262 (1.190)
Husband third generation	-3.177* (1.632)	-2.896* (1.498)	-3.735** (1.499)	-3.754*** (1.316)	-1.193 (0.953)	-1.784 (1.152)	-0.975 (1.532)	-1.024 (1.478)
ln(Family income)	-1.692*** (0.459)	-1.008** (0.424)	-2.963*** (0.471)	-2.351*** (0.442)	-2.238*** (0.624)	-0.838 (0.697)	-3.007** (1.176)	-0.876 (0.777)
Usual work hours		-0.252*** (0.022)		-0.239*** (0.025)		-0.203*** (0.015)		-0.267*** (0.020)
Husband's usual work hours		0.059*** (0.016)		0.053*** (0.017)		0.074** (0.034)		-0.003 (0.045)
No. of children under 18			0.783*** (0.206)	0.478** (0.198)			1.262** (0.515)	1.226** (0.505)
Age of youngest child in household			0.050 (0.064)	0.162** (0.072)			-0.112 (0.124)	0.086 (0.115)
Control for age, educ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FBPL FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,855	3,559	2,774	2,601	1,440	1,332	785	736
Dependent variable mean	20.85	20.94	22.30	22.36	15.28	15.41	16.05	16.23

Notes. Effect of husband's country of origin and U.S. nativity on woman's housework time. Data are from the 2003-2011 ATUS. FLFP rate in FBPL is the labor force participation rate of women in age group 25-34 in father's birthplace in 1985 (in 100 percentage point units). ln(Family income) is the log of family income (in 1999 dollars). Controls for both respondent's and husband's age and years of education are included. I exclude respondents under age 25 or enrolled in school at the time of the survey. Standard errors are clustered by husband's father's birthplace. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

eration female respondents (cols. 1-4 and cols. 5-8, respectively). First generation women's housework time is negatively correlated with both the FLFP rate in husband's father's birthplace and husband being third generation. Having an American husband is associated with a reduction of woman's housework time by about three hours per week. However, for second generation women, husbands' cultural background no longer plays a statistically significant role once the couple's working hours and number of children are taken into account.

Tables 3.3 and 3.4 indicate that spouse's country of origin and generation affect housework time of both male and female first generation immigrants. The effect of spouse's source country is statistically significant despite the fact that a majority of first generation immigrants have spouses with the same country of origin as themselves (Table 3.2 Panel B).

The relatively weak spouse effect observed among second generation men and women may be explained via two channels. First, as implied by the findings in the previous section, the respondents themselves are much more Americanized in the second generation. Hence, regardless of whom they marry, they may follow U.S. gender norms.

Second, spouse selection may be important. As seen in Table 3.2, second generation have very different marriage patterns relative to the first generation, in that they are much more likely to have spouses who are U.S. natives and who are not from the same country as themselves. Home country gender norms will be less persistent when spouses do not share the same culture. Of course, this itself is an individual choice.<sup>17</sup> The positive coefficient on *Wife U.S. born*, for example, does not prove the causal effect of American wives on husbands' housework time. U.S. born women may have chosen to marry those who are more willing to help out with household chores in the first place.

In either case, it is clear that the spouse effect exists among immigrants, particularly among the first generation. The findings in this section also imply that the assimilation in housework time observed across generations can be partly attributed to whom immigrants

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<sup>17</sup> As discussed in Fernández, Fogli, and Olivetti (2004) and Hwang (2013a), utility in marriage may differ significantly depending on the type of husband—traditional or modern.



in each generation marry.

### *3.5 Conclusion*

This paper examines the cultural effects on housework time among married immigrants in the U.S. Using the 2003-2011 American Time Use Survey, I study the time married men and women spend on basic household chores by their country of origin and generation since migrating to the U.S. The gender norms in their country of origin are represented by the female labor force participation (FLFP) rates.

I find that FLFP rates in father's birthplace have strong negative correlations with the housework time of first generation married women. However, assimilation in women's housework time occurs dramatically such that the variation across countries of origin nearly disappears by the second generation, and there is convergence towards U.S levels. Controlling for family characteristics and the couple's working hours yields similar results.

The effect of source country, and hence assimilation thereafter are not observed as strongly among male immigrants, however. They only spend a few hours per week on housework regardless of their cultural background, although second generation men from high female labor supply countries do contribute slightly more to household production than first generation men from low female labor supply countries.

The lack of variation in men's housework time does not imply that their cultural background is irrelevant to household time allocation, however. I find that husband's country of origin and U.S. nativity have significant effects on his wife's housework time, particularly when the wife is foreign born.

The findings suggest that growing up in a country with less traditional gender norms affects household time allocation by changing one's beliefs about appropriate gender roles at home, and by changing the pool of potential spouses. Not only are the second generation more likely to have less traditional gender norms compared with their parents, but they are also more likely to have spouses who were born in the U.S. It is difficult to identify how

much of the spouse effect is causal versus marital selection. But either way, marriage serves dual roles: it helps adult immigrants persist source country practices after coming to the U.S. while facilitating assimilation among the higher generations.

## Appendix

## A. Appendix to Chapter 1

### *A.1 Data Appendix*

#### *A.1.1 Korean Data*

The Korean Population Census is collected by the National Statistical Office every five years and are 2 percent samples of the population, excluding the institutionalized. Micro-data is available for years 1995, 2000, and 2005. The 2005 data does not distinguish between four-year colleges and less than four-year colleges, however, and hence I only use the 1995 and 2000 samples ( $N = 1,756,493$ ). For the most recent cohorts, I use the Korean Economically Active Population Survey instead. It is collected monthly and covers individuals age 15 and older (both in and out of labor force) in Korea. I pool all months of 2012 ( $N = 327,865$ ).

Korea's Time Use Survey is collected by the National Statistical Office and covers household members older than age 10 in 8,100 households nationwide. "Household Activities" corresponds to the same category in the Bureau of Labor Statistics time use data. Activities such as housework, food and drink preparation and clean-up, interior maintenance, exterior maintenance, vehicle maintenance, and household management are included. It does not include time spent on caring for children or other family members.

#### *A.1.2 Hong Kong Data*

The 2006 Hong Kong Population By-Census is collected by the Hong Kong Census and Statistics Department and is a 5 percent sample of the population ( $N = 460,197$ ). Educational attainment is defined using the variable EDUCNH (highest level completed). The

four groups corresponding to high school, junior college, college, and graduate school are: senior secondary, post-secondary (non-degree), post-secondary (degree), and graduate school. More specifically, senior secondary includes secondary forms 4 to 7; post-secondary (non-degree) includes various diploma courses and vocational training schools; post-secondary (degree) includes degree institutions; graduate level includes master degree, PhD, and other postgraduate courses.

### *A.1.3 Japanese Data*

The JGSS has a variable WEIGHT to weight data for population estimates based on the Japanese Population Census. In the 2000–2005 datasets, this is produced by calculating the number of people which one respondent represents by taking into account sex (two categories), 10-year age group (six categories), region (six categories), and city or not (two categories). From 2006, the variable is produced by sex (two categories) and 10-year age groups (seven categories). In order to attach weights across survey years, I harmonize this variable so that weight is constructed from sex (two categories) and 10-year age group (six categories) for all years in my sample.

Income (SZINCOMX, SSSZINCM) reports the total annual income during the previous year (before taxes and other deductions) from main job. This is converted into 1999 yen using the Consumer Price Index adjustment factors. All top-coded values in each year are multiplied by 1.45.

In the 2008 survey, age is reported in intervals. I construct respondents' exact age by subtracting birth year (which is available across all years) from the year of the survey. Respondents under age 25 are excluded from the sample. However, birth year for spouse is not provided. Hence, I take the midpoint of each 10-year age group for the spouse. The intervals range from age group 20–29 to 90–99. Hence, spouses who are actually under age 25 may be included in the analyses.

To control for the number of children when analyzing married women's labor force par-

ticipation, we need to know the number of children (under a certain age) who are currently living with the respondent. Total number of children (CCNUMTTL) variable in the JGSS, however, counts both those who left home or are deceased. Hence, I construct a variable that counts the number of children under 19 living with the respondent by compiling the age of each child (CC01AGE, CC02AGE, etc.) as reported by the respondent. Because child’s age is categorical data in 10-year age groups, I use 19 as the cut-off (instead of 18, as in other datasets).

The Japanese Time Use Survey is conducted by the Bureau of Statistics and covers household members older than age 10 in 99,000 households nationwide. “Housework” is a separate category from “Child care” and “Nursing” and includes activities such as food preparation, cleaning, caring for family members other than children, keeping the family account, and visits to the public office on personal or family matters.

#### *A.1.4 ATUS*

I weigh all observations using the person weight (WT06) to make the sample representative. Family income (FAMINCOME) includes the income of all members of the household who are 15 years of age or older. Income includes money from jobs, net income from business, pensions, dividends, interest, Social Security payments, and any other monetary income received by family members. This is the only earnings information available on the self-employed as well. It is based on categorical data; I calculate the midpoint of the categorical variable. When top-coded (\$75,000 from January to September in 2003 and \$150,000 thereafter), it is multiplied by a factor of 1.45.

Individuals whose father’s birthplace (FBPL) is indicated as regions or continents, such as “Central America n.s.” and “Africa n.s.” are excluded from the analyses. For the countries that are named or grouped differently in the ATUS from the United Nations dataset, the following adjustments have been made (FBPL are assigned the LFP rate of the country in parenthesis): Czechoslovakia and Czech Republic (Czech Republic); Korea and South Korea

(Republic of Korea); England, Scotland, Wales, United Kingdom, and United Kingdom n.s. (United Kingdom); Ireland and Northern Ireland (Ireland); Other USSR/Russia and USSR n.s. (Russian Federation).

#### *A.1.5 U.S. Census and ACS*

I weigh all observations using the IPUMS person weight (PERWT) to make the sample representative. Age at migration is calculated by subtracting the respondent's birthyear from the year of immigration variable. For cases when the year of immigration is given as intervals, I take the most conservative approach by using the last year in the bracket (to ensure that I do not include any immigrants who came to the U.S. when older than 17). Income (INCTOT) reports total pre-tax personal income or losses from all sources for the previous year. This is converted into 1999 dollars using the Consumer Price Index adjustment factors. All top-coded values in each year are multiplied by 1.45.

### *A.2 Technical Appendix*

#### *A.2.1 Discussions*

##### *Disutility Term and Joint Maximization*

Other things equal, assume that the disutility term is in men's utility function instead of women's. Then the utility of a married man of type  $M$  and  $T$  are:

$$\begin{cases} V_M(w_m, w_f) = \max_{0 \leq t_m \leq 1} \frac{1}{2}(t_m w_m + t_f w_f) + \beta \log((1 - t_m) + (1 - t_f)) \\ V_T(w_m, w_f) = \max_{0 \leq t_m \leq 1} \frac{1}{2}(t_m w_m + t_f w_f) + \beta \log((1 - t_m) + (1 - t_f)) - (\alpha_0 + \alpha_1(t_f)) \end{cases}$$

whereas a married woman's utility function is invariant to the type of husband:

$$V_f(w_m, w_f) = \max_{0 \leq t_f \leq 1} \frac{1}{2}(t_m w_m + t_f w_f) + \beta \log((1 - t_m) + (1 - t_f))$$

Given  $w_m > w_f$ , a married man always works  $t_m^* = 1$ . Unlike in Section 1.3.2, a woman's optimal time allocation,  $t_f^*$ , now does not depend on the type of husband: if  $w_f > 2\beta$ , she spends  $1 - \frac{2\beta}{w_f}$  of her time on market activities and if  $w_f \leq 2\beta$ , she stays at home.

Since  $t_f^*$  is increasing in  $w_f$ , and men's disutility is also increasing in  $t_f^*$ , there is a threshold wage  $w_f$  where  $V_T$  drops below  $\nu_m$ .<sup>1</sup> Hence, Gold Misses arise when traditional men reject educated women with wages above this threshold. (This contrasts with the model where educated women are *choosing* to remain single.) The expected utility from becoming educated ( $V_E(\lambda_M)$ ) and the fraction of educated women ( $\lambda_E$ ) thus *decrease* as women's wages rise over time.

Therefore, the model is not isomorphic to the case with the disutility term in men's utility function. In papers that study only married couples (and not whether to marry or not) or that do not focus on changes in women's wages over time (for example, Fernández, Fogli, and Olivetti, 2004) both setups may yield similar results.

Alternatively, the two cases may be isomorphic in a joint maximization framework. For example, let each married household maximize the following weighted average of husband's and wife's utility:

$$\max_{0 \leq t_m, t_f \leq 1} \theta U_m(c_m, h, t_m, t_f) + (1 - \theta) U_f(c_f, h, t_m, t_f) \quad (\text{A.1})$$

where  $0 < \theta < 1$ ,  $c_i$  is consumption,  $h$  is household public goods, and  $t_i$  is defined as before. (Unmarried agent's utility function is defined analogously.)

Assume that time spent on market activity enters directly into the utility function because the disutility from working is smaller than the disutility from doing household chores. That is, in addition to earning market wage  $w_i$ , self-fulfillment, working conditions, and other fringe benefits from a job are higher than from staying at home.<sup>2</sup>

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<sup>1</sup> I abstract from the trivial case where the disutility is so small that everybody marries.

<sup>2</sup> Note that this does not imply that individuals enjoy working per se.



Hence, some function of  $t_i$  and  $t_j$  enters in the utility of agent  $i$  married to agent  $j$ , where the marginal utility from  $t_i$ ,  $MU_{t_i}$ , is positive. For simplicity, assume  $MU_{t_j} = 0$  for all women and modern men. That is, apart from the utility gain from increase in household income, there need not be any additional utility gain from one's spouse working versus staying at home.

Traditional men, however, are characterized by  $MU_{t_j} \ll 0$ . They get disutility from wife working. Thus, solving equation (A.1) given wages, a woman is more likely to be a housewife when her husband is traditional.

Furthermore, since the disutility from working is smaller than that from housework, a woman with a sufficiently high wage would choose to remain single when matched to a traditional man. When single, she can optimally outsource housework whereas when married to a traditional man, she has to do the less enjoyable housework due to her husband's disutility. Men always prefer to marry since with  $w_m > w_f$ , they always work in equilibrium.

### *Effort and Wage Distributions*

Wages may be proportionate to the effort exerted such that a greater  $e$  generates a better wage distribution (in the sense of first-order stochastic dominance). That is,  $W(w_f; e)$  would be a continuous cumulative distribution function with support  $[0, w_m)$  where  $W(w_f; e_2) \leq W(w_f; e_1) \forall w_f$  if  $e_2 > e_1$ .

Women differ in their costs of investing in education,  $C(e)$ . Each woman chooses  $e$  to maximize her expected utility:

$$\max_{e \geq 0} W(2\beta; e)V_U(\lambda_M) + (1 - W(2\beta; e))V_E(\lambda_M) - C(e)$$

where  $V_U(\lambda_M)$  and  $V_E(\lambda_M)$  are defined as in equation (1.7). Once a woman chooses her optimal  $e^*$ , she draws her wage from  $W(w_f; e^*)$ . If her wage is higher than  $2\beta$ , she works in equilibrium. If her wage is lower, she becomes a full-time housewife.

The difference with my model is that by choosing  $e$ , each woman can directly affect the wage distribution from which she draws from. Since the support of  $W(w_f; e)$  is  $[0, w_m)$ , there is a probability that even an educated woman draws a wage lower than  $2\beta$ . Thus, women would be distinguished by their revealed wages instead of their education investment per se. Consequently, equation (1.9) would also be redefined, such that  $\lambda_E$  equals the fraction of women who draw wages above  $2\beta$ . Marriage and household time allocation decisions are unaffected since they are functions of  $w_f$ , and not  $e$ .

This alternative setup would require one to define how  $e$  translates into different wage distributions and how that also interacts with the wage distribution exogenously changing over time.

#### A.2.2 Proofs of Propositions

**Proposition 1.** *When  $\alpha_0$  and  $\alpha_1$  satisfy equation (1.5),  $\underline{w}_E < \tilde{w}_E < w_m$ . When they are larger,  $\tilde{w}_E < \underline{w}_E < w_m$ . When they are smaller,  $\underline{w}_E < w_m < \tilde{w}_E$ .*

*Proof.*  $\underline{w}_E < \tilde{w}_E$  holds if  $\nu_f < V_{ET}$  at  $w_f = \underline{w}_E$ .  $\underline{w}_E$  can be found from equating  $V_{UT}$  with  $V_{ET}$ . Plug in the expression for  $\underline{w}_E$  to equations (1.3) and (1.4). The inequality with regards to  $\alpha$  is:  $\alpha_0 + \alpha_1 < \frac{1}{2}(w_m - \underline{w}_E) + \beta \log 2$

$\tilde{w}_E < w_m$  holds if  $\nu_f > V_{ET}$  at  $w_f = w_m$ . Plug in  $w_m$  to equations (1.3) and (1.4). The inequality with regards to  $\alpha$  is:  $\alpha_0 + \alpha_1 > \beta \log 2$ .

When both inequalities above are satisfied,  $\underline{w}_E < \tilde{w}_E < w_m$ . □

**Proposition 2.**  *$\hat{e}(\lambda_M)$  is an increasing function of  $\lambda_M$ , and  $\hat{e}(\lambda_M) \geq 0$  always holds.*

*Proof.* Since  $\hat{e}(\lambda_M)$  is defined as in equation (1.8) and  $V_U'(\lambda_M) = \alpha_0$ , we just need to show that  $V_E'(\lambda_M) > \alpha_0$  holds.

$$V_E'(\lambda_M) = \int_{2\beta}^{\underline{w}_E} (V_{EM} - V_{ET})dW + \int_{\underline{w}_E}^{\tilde{w}_E} \alpha_0 dW + \int_{\tilde{w}_E}^{w_m} (V_{EM} - \nu_f)dW$$

Plugging in the equations for  $V_{EM}$ ,  $V_{ET}$ , and  $\nu_f$  from equations (1.3) and (1.4), the expression becomes:

$$V_E'(\lambda_M) = \alpha_0 + \int_{2\beta}^{\underline{w}_E} \left( \frac{1}{2}w_E - \beta + \beta \log\left(\frac{2\beta}{w_E}\right) \right) dW + \int_{\tilde{w}_E}^{w_m} \left( \frac{1}{2}(w_m - w_E) + \beta \log 2 - \alpha_0 \right) dW$$

The first integral is non-negative when  $w_E \geq 2\beta$ . (It equals zero if  $w_E$  are all higher than  $\underline{w}_E$ .) By assumption (1.5) and that  $\alpha_0 \leq \beta \log 2$ , the second integral is positive. (It would equal zero if and only if  $\alpha_0 = \beta \log 2$  and there is a discrete jump at  $w_E = w_m$  such that  $\text{prob}(\tilde{w}_E \leq w_E < w_m) = 0$ . Since  $W(w_E)$  is a continuous cumulative function over  $(2\beta, w_m)$ , the latter condition cannot hold.) Hence  $V_E'(\lambda_M) > \alpha_0$  and therefore  $V_E'(\lambda_M) - V_U'(\lambda_M) > 0$ .

Since  $\hat{e}(\lambda_M)$  is an increasing function of  $\lambda_M$ , it is sufficient to show that  $\hat{e}(0) > 0$ .  $\hat{e}(0) = \int_{2\beta}^{\tilde{w}_E} V_{ET} dW + \int_{\tilde{w}_E}^{w_m} \nu_f dW - V_{UT}$ . We know that  $V_{ET} = V_{UT}$  when  $2\beta < w_E \leq \underline{w}_E$ ,  $V_{ET} > V_{UT}$  when  $\underline{w}_E < w_E \leq \tilde{w}_E$ , and  $\nu_f > V_{ET}$  when  $w_E > \tilde{w}_E$ . Thus  $\hat{e}(0) \geq 0$  always holds.  $\square$

**Proposition 3.** *Given  $W_{t-1}(\cdot)$  and  $\lambda_{Mt-1}$ , if the distribution  $W_{t1}(\cdot)$  first-order stochastically dominates  $W_{t2}(\cdot)$ ,  $F_{Et1} \geq F_{Et2}$ .*

*Proof.* Given  $W_{t-1}(\cdot)$  and  $\lambda_{Mt-1}$ ,  $\lambda_{Mt}$  is determined regardless of  $W_t(\cdot)$  (see equation (1.1)).  $\hat{e}(\lambda_{Mt}) = V_E(\lambda_{Mt}) - V_U(\lambda_{Mt})$ .  $V_U(\lambda_{Mt})$  is invariant to changes in  $w_E$ . So we just need to show that

$$V_E(\lambda_{Mt}) = \int_{2\beta}^{\tilde{w}_E} (\lambda_{Mt} V_{EM} + (1 - \lambda_{Mt}) V_{ET}) dW_t + \int_{\tilde{w}_E}^{w_m} (\lambda_{Mt} V_{EM} + (1 - \lambda_{Mt}) \nu_f) dW_t$$

is larger under  $W_{t1}(\cdot)$  than under  $W_{t2}(\cdot)$ .

By definition of first-order stochastic dominance,  $W_{t1}(\tilde{w}_E) \leq W_{t2}(\tilde{w}_E)$  and hence the probability weight on the second integral is relatively larger under  $W_{t1}(\cdot)$  than under  $W_{t2}(\cdot)$ . Since  $V_{EM}$  is an increasing function of  $w_E$  and  $V_{ET} < \nu_f$  when  $w_E > \tilde{w}_E$  (by definition of  $\tilde{w}_E$ ),  $(\lambda_M V_{EM} + (1 - \lambda_M) \nu_f)$  is larger than  $(\lambda_M V_{EM} + (1 - \lambda_M) V_{ET})$ . Hence the probability

weight on the larger term is larger under  $W_{t1}(\cdot)$  than under  $W_{t2}(\cdot)$ .

The comparative statics follows directly from equations (1.9) and (1.10).  $\square$

**Proposition 4.** *Given  $W_{t-1}(\cdot)$  and  $\lambda_{Mt-1}$ , educated women's marriage probability is an increasing function of  $W_t(\tilde{w}_E)$ . Hence if the distribution  $W_{t1}(\cdot)$  first-order stochastically dominates  $W_{t2}(\cdot)$ ,  $p_{Et1} \leq p_{Et2}$ .*

*Proof.* We need to show that  $p_E(\lambda_{Mt})$  (as defined in equation (1.6)) is smaller under  $W_{t1}(\cdot)$  than under  $W_{t2}(\cdot)$ . Given  $W_{t-1}(\cdot)$  and  $\lambda_{Mt-1}$ ,  $\lambda_{Mt}$  does not change with regards to  $W_t(\cdot)$  (see equation (1.1)).  $p_E(\lambda_{Mt})$  can be rewritten as  $W_t(\tilde{w}_E)(1 - \lambda_{Mt}) + \lambda_{Mt}$ . Since  $\lambda_{Mt} < 1$ ,  $p_{Et}$  is an increasing function of  $W_t(\tilde{w}_E)$ .  $\square$

**Proposition 5.** *Suppose  $W_t(\cdot)$  first-order stochastically dominates  $W_{t-1}(\cdot)$  at all  $t$ . The decrease in  $p_E$  from  $t - 1$  to  $t$  is larger when (i) the drop in  $W(\tilde{w}_E)$  from  $t - 1$  to  $t$  is larger and (ii) the shift in  $W(\cdot)$  from  $t - 2$  to  $t - 1$  is smaller.*

*Proof.* Condition (i): From Proposition 4, we know that  $p_E(\lambda_{Mt})$  decreases in  $W_t(\tilde{w}_E)$  given  $\lambda_{Mt}$ . Hence a drop in  $W(\tilde{w}_E)$  from  $t - 1$  to  $t$  helps decrease educated women's marriage probability.

Condition (ii): By Proposition 3 and equation (1.1), we know that the increase in  $\lambda_M$  from  $t - 1$  to  $t$  is larger when the (first-order stochastically dominating) change in  $W(\cdot)$  from  $t - 2$  to  $t - 1$  is larger. Hence if there is a large positive shift in the wage distribution from  $t - 2$  to  $t - 1$ ,  $\lambda_{Mt}$  would be much larger than  $\lambda_{Mt-1}$ . This helps increase educated women's marriage probability since  $p_E(\lambda_{Mt})$  increases in  $\lambda_{Mt}$  (see equation (1.6)) given  $W_t(\cdot)$ .

Both (i) and (ii) are needed for the Gold Miss phenomenon to arise. If only condition (i) holds and there was a significant wage growth from  $t - 2$  to  $t - 1$ , then even if there is a large drop in  $W(\tilde{w}_E)$  at  $t$ ,  $p_E$  may not fall because there is now a larger fraction of modern type in the marriage market than at  $t - 1$ . Conversely, if only condition (ii) holds and there is only a trivial change in  $W(\tilde{w}_E)$ ,  $p_E$  would not fall since a woman (matched to a traditional type) does not forgo marriage unless her wage is higher than  $\tilde{w}_E$ .  $\square$

Table A.1: Descriptive Statistics, JGSS Sample

	Men		Women	
	Mean	SD	Mean	SD
Birthyear	1953.28	(15.79)	1951.98	(16.72)
Age	50.29	(15.65)	51.58	(16.61)
College graduate	0.33	(0.47)	0.12	(0.32)
LFP	0.80	(0.40)	0.52	(0.50)
Ever married	0.82	(0.38)	0.89	(0.32)
Currently married	0.78	(0.42)	0.72	(0.45)
Mother's LFP at age 15	0.67	(0.47)	0.69	(0.46)
Mother college graduate	0.03	(0.16)	0.02	(0.15)
Father college graduate	0.11	(0.31)	0.10	(0.30)
Rural at age 15	0.45	(0.50)	0.43	(0.50)
N	7,317		8,569	

*Notes.* Means and standard deviations by sex. Data are from the 2000–2008 JGSS. See Appendix A.1.3 for details. LFP is an indicator variable that equals 1 if the respondent is in the labor force. Mother's LFP at age 15 equals 1 if mother had a paying job when respondent was about 15 years old. I exclude respondents under age 25 or enrolled in school at the time of the survey. All observations are weighted by the person weight.

Table A.2: Descriptive Statistics of Married Respondents from Gold Miss Countries, ATUS Sample

	Men		Women	
	Mean	SD	Mean	SD
Year of birth	1958.32	(14.46)	1960.79	(13.55)
College graduate	0.81	(0.39)	0.61	(0.49)
U.S. born	0.16	(0.37)	0.15	(0.36)
LFP	0.85	(0.36)	0.53	(0.50)
Usual work hours	35.45	(19.56)	22.23	(24.66)
Spouse's usual work hours	15.68	(20.76)	35.43	(23.00)
ln(Family income)	11.03	(0.81)	10.95	(0.86)
No. of children under 18	0.99	(0.99)	0.86	(1.05)
N	116		163	

*Notes.* Mean and standard deviations by sex, among married respondents whose father's birthplace is Hong Kong, Japan, Korea, Singapore, or Taiwan. Data are from the 2003–2011 ATUS. See Appendix A.1.4 for details. Usual work hours are number of hours per week, and individuals who responded “hours vary” are excluded. ln(Family income) is the log of family income (in 1999 dollars). I exclude respondents under age 25 or enrolled in school at the time of the survey. All observations are weighted by the person weight.

Table A.3: Descriptive Statistics of Koreans and Japanese in the U.S., Census and ACS Sample

	Foreign born		U.S. born	
	Men	Women	Men	Women
Year of birth	1967.71 (9.18)	1966.82 (10.56)	1950.77 (18.15)	1949.08 (18.89)
College graduate	0.61 (0.49)	0.59 (0.49)	0.46 (0.50)	0.43 (0.49)
LFP	0.93 (0.26)	0.86 (0.34)	0.73 (0.45)	0.64 (0.48)
ln(Income)	10.60 (1.05)	10.10 (1.19)	10.47 (0.99)	9.98 (1.08)
Ever married	0.69 (0.46)	0.73 (0.44)	0.74 (0.44)	0.80 (0.40)
Currently Married	0.60 (0.49)	0.57 (0.50)	0.60 (0.49)	0.55 (0.50)
Japanese	0.14 (0.35)	0.18 (0.38)	0.86 (0.35)	0.86 (0.35)
Speaks English well	0.96 (0.20)	0.96 (0.21)	0.98 (0.14)	0.97 (0.16)
Year of immigration	1978.43 (9.52)	1977.32 (10.67)		
Age at immigration	10.72 (4.35)	10.50 (4.54)		
N	7,189	7,366	45,238	44,794

*Notes.* Means and standard deviations by sex and nativity, among Koreans and Japanese in the U.S. Data are from the 1980, 1990, 2000 Census and 2001–2010 ACS. See Appendix A.1.5 for details. Foreign born only includes those who migrated to the U.S. between ages 3–17. LFP is an indicator variable that equals 1 if the respondent is in the labor force. ln(Income) is the log of total personal income (in 1999 dollars). “Speaks English well” is an indicator variable that equals 1 if the respondent “speaks only English,” “speaks English very well,” or “speaks English well” and 0 if “does not speak English” or “can speak English but not well.” I exclude respondents under age 25 or still attending school at the time of the survey. All observations are weighted by the IPUMS person weight.

Table A.4: Effect of Husband's Ethnicity and U.S. Nativity on LFP of Korean and Japanese Women in the U.S.

	Dependent variable=1 if participate in labor force	
	Foreign born	U.S. born
	KrJp women (1)	KrJp women (2)
Husband not KrJp	0.093*** (0.026)	0.002 (0.010)
Husband U.S. born	-0.004 (0.026)	0.024 (0.020)
Husband college graduate	-0.017 (0.023)	-0.027*** (0.010)
ln(Husband's income)	-0.080*** (0.010)	-0.024*** (0.005)
College graduate	0.110*** (0.022)	0.064*** (0.010)
No. of children under 18	-0.037*** (0.010)	-0.009** (0.005)
No. of children under 5	-0.116*** (0.017)	-0.131*** (0.012)
Control for age	Yes	Yes
Control for ethnicity	Yes	Yes
State FE	Yes	Yes
Cohort FE	Yes	Yes
N	5,262	24,637
Dependent variable mean	0.66	0.63

*Notes.* Effect of husband's ethnicity and U.S. nativity on labor force participation, among married Korean and Japanese (KrJp) women in the U.S. Data are from the 1980, 1990, 2000 Census and 2001–2010 ACS. Controls for both respondent's and spouse's age are included. ln(Husband's income) is the log of husband's total personal income (in 1999 dollars). Birth cohort is grouped into six decennial periods, from 1925–1934 to 1975–1985. I exclude respondents who have migrated to the U.S. under age 3 or over 17, who are under age 25, or still attending school at the time of the survey. Robust standard errors in brackets. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table A.5: Marrying-Up?, Korean and Japanese Women in the U.S.

	Dependent variable=1 if husband's education is higher than wife's	
	Foreign born KrJp women (1)	U.S. born KrJp women (2)
Husband not Korean or Japanese	-0.023 (0.026)	-0.016* (0.010)
Husband U.S. born	0.009 (0.026)	-0.022 (0.018)
Husband's age	0.006*** (0.002)	-0.001 (0.001)
Education	-0.150*** (0.009)	-0.134*** (0.004)
Age	-0.006** (0.002)	0.002 (0.001)
Control for ethnicity	Yes	Yes
State FE	Yes	Yes
Cohort FE	Yes	Yes
N	5,379	24,928
Dependent variable mean	0.33	0.26

*Notes.* Husband's relative educational attainment, among married Korean and Japanese (KrJp) women in the U.S. Data are from the 1980, 1990, 2000 Census and 2001–2010 ACS. Educational attainment is divided into four groups: high school graduate or less, some college, four-year college graduate, and graduate and professional degrees. The dependent variable equals 1 if husband's education is higher than wife's by at least one step. Birth cohort is grouped into six decennial periods, from 1925–1934 to 1975–1985. I exclude respondents who have migrated to the U.S. under age 3 or over 17, who are under age 25, or still attending school at the time of the survey. Robust standard errors in brackets. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .





*Figure A.1: Countries by Female Labor Force Participation Rates in 1985*

*Notes.* High and low female labor force participation (FLFP) countries. FLFP data are from the United Nations (UN) and are matched to father's birthplace in the ATUS sample. See Appendix A.1.4 for details. Father's birthplace is defined as high (low) FLFP if labor force participation rates of women in age group 25–34 were higher (lower) than that of the U.S. in 1985. Total of 121 countries in the UN data are matched to the ATUS sample—42 high FLFP (light gray) and 79 low FLFP (dark gray). Unmatched countries (either because they do not have data on FLFP or because they are not available as father's birthplace in the ATUS) are in white.

## B. Appendix to Chapter 2

### *Proof of Proposition 1*

*Proof.* Let's consider each case separately. First, when  $x > 1 - \beta^M \delta$ , the (LHS) of  $(PC)$  is negative for any  $0 < \alpha < 1$  whereas the (RHS) is positive (by assumption).  $(PC)$  does not hold and so agenda setter's proposal for gradualism will always be rejected by the median voter.

Second, when  $1 - \frac{c_1}{c_2}x < 1 - \beta^M$ ,  $\alpha^* > \hat{\alpha}$  (see Figure 2.1). There is no  $\alpha$  that the agenda setter would propose instead of BB2 that would also satisfy  $(PC)$ .

Lastly, when  $0 < x < 1 - \frac{c_1}{c_2}$ ,  $\alpha^* < \hat{\alpha}$ . Since the agenda setter's utility is decreasing in  $\alpha$  (see equation (2.6)), she proposes the smallest  $\alpha$  that satisfies  $(PC)$ .  $\square$

## C. Appendix to Chapter 3

### *C.1 Data Appendix*

I weigh all observations using the person weight (WT06) to make the sample representative. Family income (FAMINCOME) includes the income of all members of the household who are 15 years of age or older. Income includes money from jobs, net income from business, pensions, dividends, interest, Social Security payments, and any other monetary income received by family members. This is the only earnings information available on the self-employed as well. It is based on categorical data; I calculate the midpoint of the categorical variable. When top-coded (\$75,000 from January to September in 2003 and \$150,000 thereafter), it is multiplied by a factor of 1.45.

Individuals whose father's birthplace (FBPL) is indicated as regions or continents, such as "Central America n.s." and "Africa n.s." are excluded from the analyses. For the countries that are named or grouped differently in the ATUS from the United Nations dataset, the following adjustments have been made (FBPL are assigned the LFP rate of the country in parenthesis): Czechoslovakia and Czech Republic (Czech Republic); Korea and South Korea (Republic of Korea); England, Scotland, Wales, United Kingdom, and United Kingdom n.s. (United Kingdom); Ireland and Northern Ireland (Ireland); Other USSR/Russia and USSR n.s. (Russian Federation).

Table C.1: Descriptive Statistics, Married with Spouse Present

	First Generation		Second Generation	
	Men	Women	Men	Women
Age	45.52 (12.76)	43.25 (12.55)	56.04 (16.95)	51.28 (17.58)
Educ yrs	12.17 (4.83)	12.26 (4.54)	13.77 (3.50)	13.81 (3.07)
LFP	0.87 (0.33)	0.58 (0.49)	0.64 (0.48)	0.55 (0.50)
Usual work hours	36.32 (19.09)	19.15 (20.23)	26.54 (23.59)	19.24 (20.61)
Spouse's usual work hours	19.94 (20.74)	34.51 (20.26)	17.00 (20.12)	26.96 (22.74)
ln(Family income)	10.55 (0.85)	10.57 (0.87)	10.78 (0.80)	10.77 (0.84)
No. of children under 18	1.40 (1.30)	1.41 (1.30)	0.79 (1.16)	0.91 (1.21)
FLFP rate at FBPL	50.72 (17.18)	50.90 (17.00)	58.50 (16.05)	56.84 (15.72)
Mexican origin	0.37 (0.48)	0.37 (0.48)	0.17 (0.38)	0.17 (0.37)
N	3,042	3,564	1,171	1,309

*Notes.* Mean and standard deviations by sex and generation, among married respondents. Data are from the 2003–2011 ATUS. See Data Appendix for details. Usual work hours are number of hours per week, and individuals who responded “hours vary” are excluded. ln(Family income) is the log of family income (in 1999 dollars). FLFP rate at FBPL is the labor force participation rate of women in age group 25–34 at father’s birthplace in 1985. I exclude respondents under age 25 or enrolled in school at the time of the survey. All observations are weighted by the person weight.

Table C.2: Assimilation in Housework Time (Including FBPL FE), Married with Spouse Present

	Dependent variable: Housework time (hours per week)							
	Men				Women			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Second generation	0.057 (0.432)	-0.340 (0.429)	0.640 (0.580)	0.421 (0.614)	-4.098*** (0.695)	-3.613*** (0.662)	-4.224*** (0.860)	-2.962*** (0.816)
ln(Family income)	-0.045 (0.192)	0.227 (0.219)	-0.345 (0.254)	-0.182 (0.287)	-1.928*** (0.412)	-1.000** (0.410)	-3.048*** (0.489)	-2.211*** (0.500)
Usual work hours		-0.073*** (0.011)		-0.081*** (0.015)		-0.241*** (0.014)		-0.244*** (0.018)
Spouse's usual work hours		0.047*** (0.009)		0.057*** (0.012)		0.064*** (0.015)		0.047** (0.021)
No. of children under 18			0.118 (0.216)	0.242 (0.239)			1.061*** (0.354)	0.764** (0.345)
Age of youngest child in household			-0.020 (0.046)	-0.033 (0.049)			0.038 (0.085)	0.166* (0.085)
Control for age, educ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FBPL FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4,868	4,354	3,165	2,843	5,431	5,020	3,653	3,427
Dependent variable mean	4.57	4.58	4.63	4.71	19.28	19.38	21.04	21.12

*Notes.* Effect of U.S. nativity on housework time, among married respondents. Data are from the 2003-2011 ATUS. See Data Appendix for details. ln(Family income) is the log of family income (in 1999 dollars). Controls for both respondent's and spouse's age and years of education are included. Controls for both respondent's and spouse's age are included. I exclude respondents under age 25 or enrolled in school at the time of the survey. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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